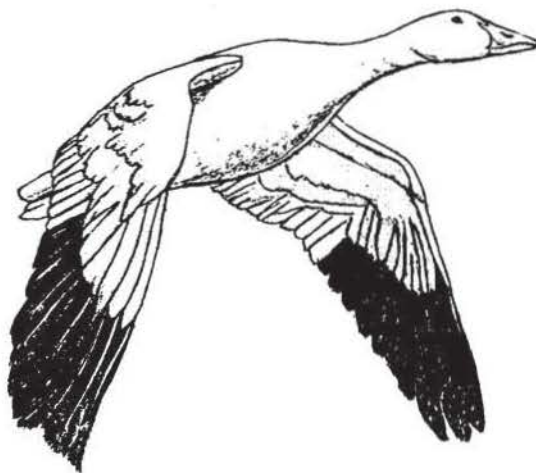


# ***MASTER PLAN***

*CHINCOTEAGUE NATIONAL WILDLIFE REFUGE  
VIRGINIA AND MARYLAND*

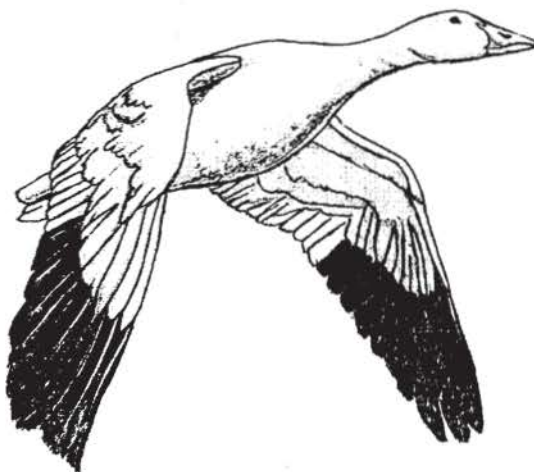


*United States Department of the Interior  
United States Fish and Wildlife Service  
Northeast Region Five*

*1993*

# MASTER PLAN

## CHINCOTEAGUE NATIONAL WILDLIFE REFUGE



Submitted by: John D Schroeer Date: 12/16/93  
Refuge Manager

Reviewed by: Thomas W Andrews Date: 16 Dec 93  
Associate Manager

Concurred by: Arthur A. Laffer Date: 12/27/93  
ACTING Assistant Regional Director

Approved by: Donald E Lamberton Date: 12-27-93  
Regional Director

## **The Station Message**

### **Chincoteague National Wildlife Refuge**

The Chincoteague National Wildlife Refuge includes 13,682 acres of beach, dune, marsh and forest habitats. Most of the refuge is located on the Virginia end of Assateague Island, although 418 acres are on the Maryland side, 427 acres are found in the Morris Island, group and 492 acres comprise Wildcat Marsh on the northern tip of Chincoteague Island. Parts or all of the following Virginia islands are also included in the refuge: Assawoman, Metompkin, and Cedar. The refuge was established in 1943 under authority of the Migratory Bird Conservation Act "... for use as an inviolate sanctuary or for any other management purpose, for migratory birds," especially migrating and wintering waterfowl. Since that time objectives have been expanded to protect and manage threatened and endangered species and provide for wildlife-oriented public use.

Approximately 2,600 acres of fresh and brackish-water impoundments on the refuge have been created for migratory birds. The refuge provides and manages habitat for waterfowl, especially black ducks, as part of a long-term effort, in compliance with the North American Waterfowl Management Plan, to reverse significant drops in their populations. These efforts also benefit other wildlife, especially shore and wading birds. Other management programs address the needs of upland wildlife, and efforts are made to preserve, restore, and enhance, endangered and threatened animals in their natural ecosystems.

Refuge forests are managed to establish and maintain habitat for breeding populations of the Delmarva Peninsula fox squirrel and provide benefits for other forest wildlife. In fact the refuge has specific responsibility for the implementation of many parts of the recovery plan for this endangered animal.

A nesting tower is maintained for a resident pair of endangered peregrine falcons, and refuge objectives support hundreds of these birds that stop to feed and rest during migration.

The refuge supports more pairs of nesting piping plovers, a threatened species, than any other refuge. The birds are monitored and protected through a variety of techniques including predator control, predator exclosures, seasonal public use closures of Toms Cove Hook, and minimizing human disturbance in other areas where plovers nest.

Refuge uses and habitats are managed to ensure adequate resting and feeding sites for migrating shorebirds, since the refuge is one of the country's top five shorebird migration staging areas east of the Rocky Mountains and is designated an International Reserve by the Western Hemisphere Shorebird Reserve Network.

Efforts are made to preserve the refuge's natural diversity and abundance of flora and fauna. Human activity is diverted away from sensitive areas, and vegetation is altered through techniques such as prescribed burning and mowing to favor the growth of desirable plant communities. Impoundment water levels are manipulated to encourage growth of waterfowl plant foods and improve overall impoundment vegetation for winter feeding, nesting, and other wildlife uses.

Southern pine beetle infestations that damage valuable wildlife habitat are managed through forestry practices, such as select cuts, to prevent outbreaks.

Predators, specifically red fox and raccoon, are controlled annually to help protect nesting shorebirds, waterfowl, and Delmarva Peninsula fox squirrels.

Sika and white-tailed deer are managed, in the absence of natural predators, through hunting programs to prevent overbrowsing which retards forest regeneration to the detriment of other wildlife species.

Management works to ensure that significant cultural resources are protected in refuge development and planning efforts.

Refuge efforts continue toward acquiring land and water for increased conservation of migratory bird resources and to protect important wildlife habitat from the impacts of development.

The Refuge Administration Act established a mandate to ensure that recreational use be managed in a manner compatible with the primary purposes of the refuge. The refuge is working to balance increasing demands for recreation and economic opportunities with the need to protect and enhance wildlife populations that depend on the refuge.





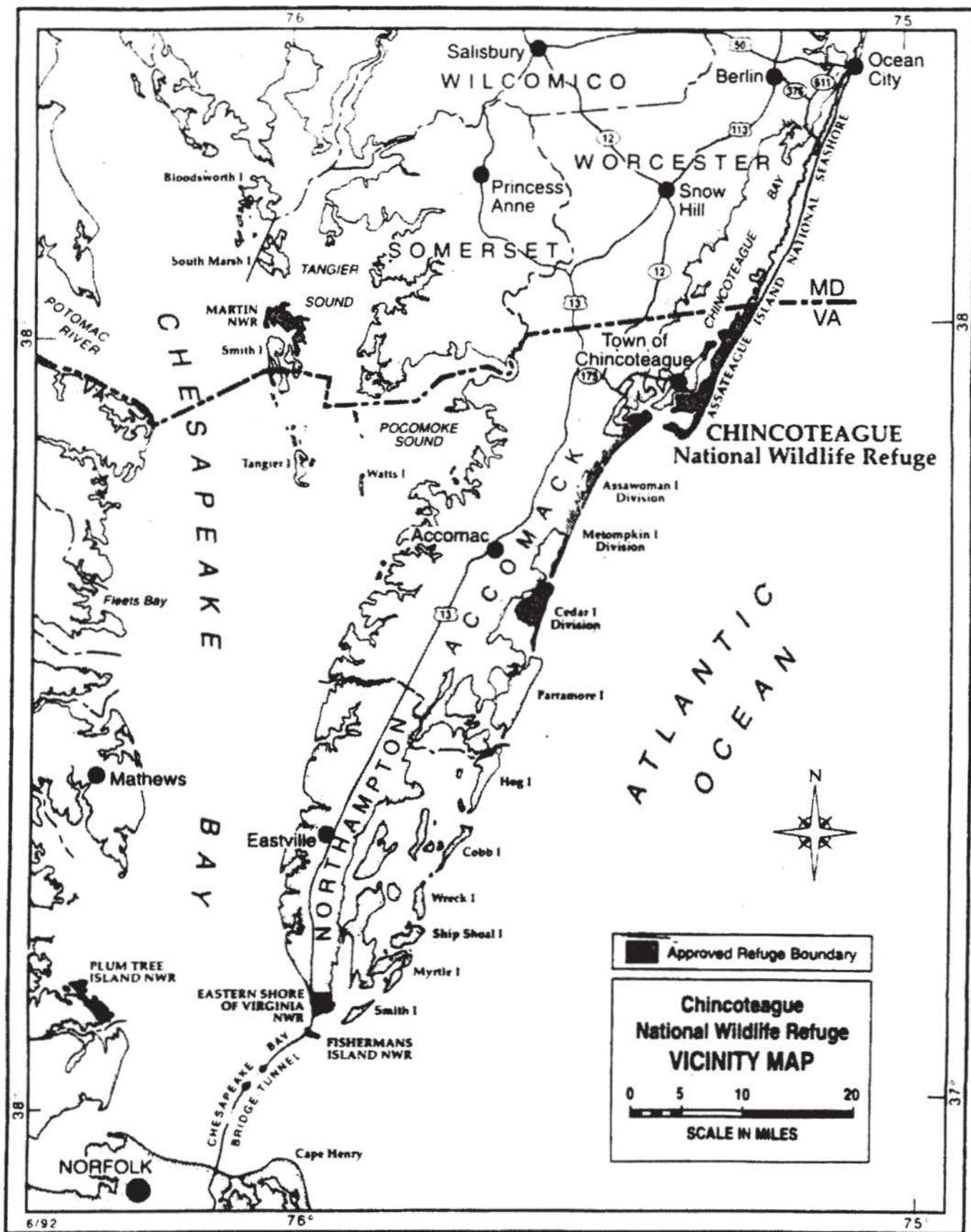
## CHINCOTEAGUE NATIONAL WILDLIFE REFUGE

The refuge's purposes are determined by various Acts by which funding was provided for acquisitions and are as follows:

"...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." (Migratory Bird Conservation Act)

"... suitable for - (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species..." (Refuge Recreation Act)

"...the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligation contained in various migratory bird treaties and conventions..." (Emergency Wetlands Resources Act of 1986)



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## INTRODUCTION

This Master Plan provides a ready reference to the legal mandates, policy direction, resource structure, and planning decisions governing the long-range direction of the Chincoteague National Wildlife Refuge.

### PURPOSE

The purpose of this Master Plan is to give overall guidance for the protection, use, and development of Chincoteague National Wildlife Refuge during the next ten to twenty years. By describing activities needed to attain long-range management goals, this Master Plan establishes a comprehensive framework for refuge management that will:

- ensure consistency with national and regional Fish and Wildlife Service policy and direction;
- facilitate a timely response to current and anticipated threats to the refuge environment;
- provide continuity in refuge management;
- guide inventory and research efforts; and
- substantiate funding requests.

The primary impetus for master planning of Chincoteague Refuge came from a growing need to balance high visitation with protection and enhancement of wildlife populations that depend on refuge habitat. The situation was viewed in the broad context of regional and national trends in loss of wildlife habitat and demand for recreational and economic opportunities.

Pressures on wildlife are indicated in a number of ways:

- More than half of the original waterfowl habitat along the middle-upper Atlantic Coast has been lost to development or other

land use change. The quality of much of the remaining habitat has decreased substantially.

- With human population growth and expanding commercial and recreational development in North and South America, the number of resting and feeding sites for migrating shorebirds has steadily dwindled.
- Loss of sandy beaches and other littoral habitats to recreational and commercial developments, as well as reduced breeding success caused by human disturbance, were cited as major factors contributing to the January 1986 listing of the Atlantic Coast piping plover as a threatened species protected by the Endangered Species Act (Federal Register, 1985).
- Decline of the endangered Delmarva Peninsula fox squirrel is attributed to conversion of mature timberlands to agricultural lands and young growth forests (USFWS, Delmarva Peninsula Fox Squirrel Recovery Plan, 1993).

As regional habitat loss increases wildlife's dependency on refuges like Chincoteague, the general demand for recreational opportunities continues to grow. Although analysis of visitor figures indicates a gradual slowing of the rate of increase of visitation, researchers predict that, without a change in current public use management practices, the number of visitors to Chincoteague Refuge would continue to increase through the year 2000 (Aiken, 1987).

Even with no growth, public use on the current scale can exert significant impacts on refuge wildlife. While facilities such as roads and parking areas occupy only a small portion of refuge acreage, their use reduces the habitat value of larger adjacent areas by discouraging species that are sensitive to disturbance. Furthermore, because Chincoteague Refuge is located on a barrier island subject to constant geomorphological changes, maintenance of beach area facilities is difficult. Measures to reinforce or protect beach facilities from stormy seas may involve further loss of wildlife habitat, either through direct habitat modification or interruption of coastal processes vital to habitat maintenance.

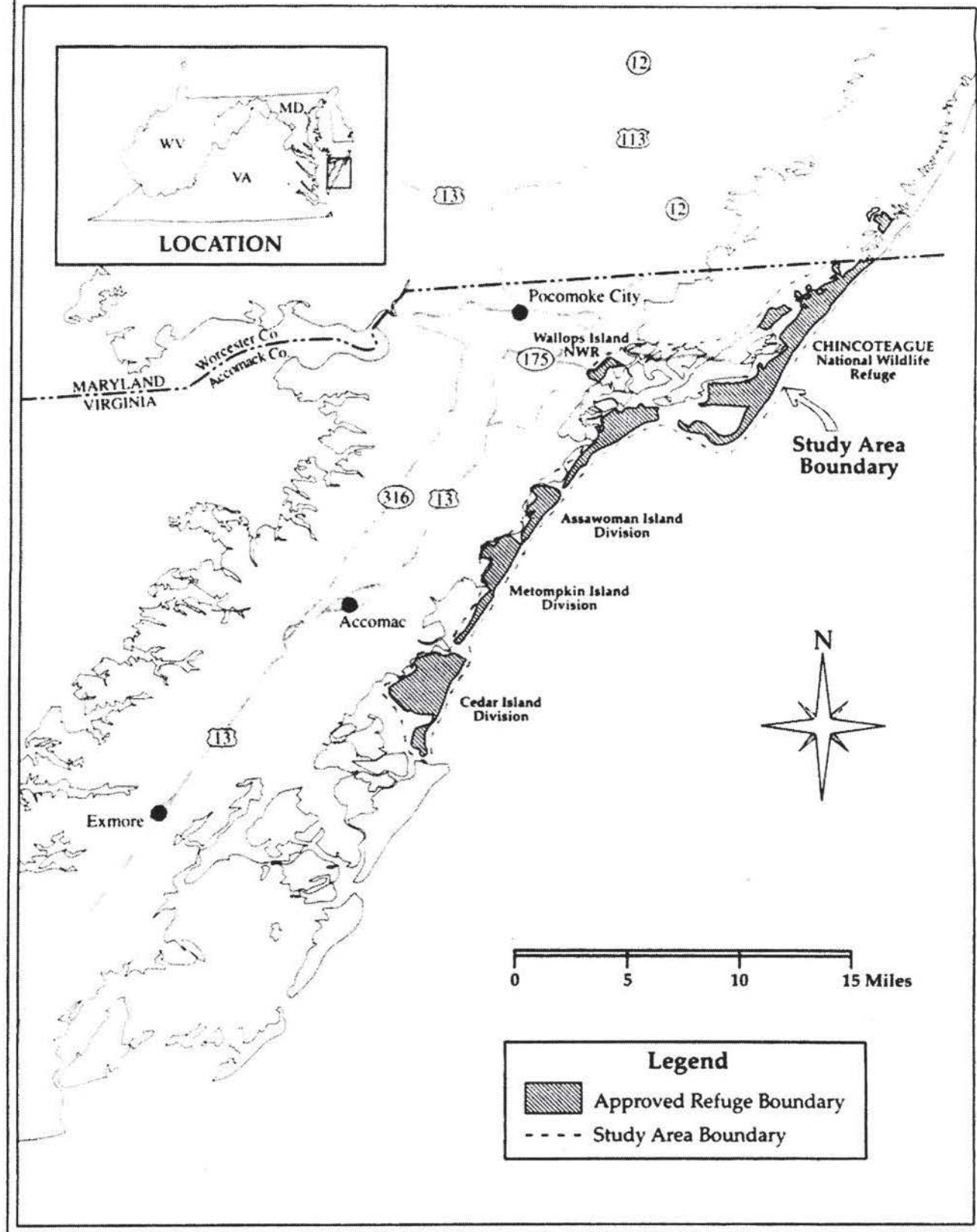
Resolution of these differences is the major challenge to which this Master Plan responded. Two other factors made it especially important that these issues be addressed in a long-range plan:

- In 1965, Congress established the Assateague Island National Seashore (AINS), encompassing Chincoteague Refuge as well as the northern portion of Assateague Island. The legislation provided for primary management of the refuge for wildlife and secondarily for public use. A 1979 Memorandum of Understanding between the National Park Service, the agency charged with administration of AINS, and the Fish and Wildlife Service assigned administration of public use of the refuge's Toms Cove Hook portion to the National Park Service, while the Fish and Wildlife Service retained wildlife management responsibility on the Hook. In 1990, agency responsibilities were further refined in a revised Interagency Agreement. Dual responsibility for managing Toms Cove Hook requires clear articulation of long-range objectives to ensure that recreational use is managed in a manner consistent with wildlife needs.
- According to a 1985 survey conducted by the Chincoteague Mayor and Town Council's Advisory Committee on Tourism, 71% of all business on Chincoteague Island is related to tourism. Since Chincoteague Refuge is the town's major tourist attraction, refuge management policies and practices that affect public use opportunities will have direct consequences on the town economy and residents.

## STUDY AREA

The study area for the master plan includes lands within the current refuge ownership boundary, lands currently approved for acquisition, and adjacent lands with uses that directly affect the master plan decision-making process (see Figure 2).

Effective refuge planning requires consideration of the land uses and other cultural and socioeconomic characteristics of Chincoteague and Piny Islands, as well as consideration of the wildlife habitat capabilities of marshes in





Chincoteague Bay. Wallops Island National Wildlife Refuge, a "satellite" refuge of Chincoteague NWR located on the mainland adjacent to Chincoteague Bay, is also included in the study area.

Information about these surrounding areas provides a better understanding of the refuge's natural and socioeconomic resources. Fish and Wildlife Service management cannot be implemented beyond the refuge boundary without completion of land acquisition procedures, or establishment of cooperative agreements with concerned parties.

## **Historical Context**

### **Prehistoric:**

The Atlantic Coast of North America has been populated by humans for at least 12,000 years. Although no direct evidence has yet been found, the barrier islands were likely used for seasonal plant gathering, hunting, and fishing. At the time of initial European contact, several native American groups lived in the general area, and may have traded with explorers from passing vessels (Wroten, 1972). Groups living on the mainland in the vicinity of Chincoteague and Assateague islands included the Kicotanks, Nassawattex, Chincoteague, Manokin, Assateague, Annamessex, Acquintica, and Pocomoke.

### **Historic:**

The first European explorer to record landing in the Assateague Island vicinity (probably on the mainland) was Giovanni da Verrazano, sailing for the King of France in 1524 (Bearss, 1968). During the next one hundred years, many explorers investigated the area, but colonists preferred the better soils and protected environment on the mainland. In the late-1600's Chincoteague and Assateague Islands were used to graze livestock by landowners wanting to avoid fencing ordinances on the mainland. Camps for livestock herders were established (Bearss, 1968; Wroten, 1972); salt extraction and shellfishing brought more island inhabitants.

Shipwrecks along the unpredictable offshore shoals were frequent as coastal trade developed, and "wrecking", or stripping stranded ships of their cargo, became a common practice of some island dwellers (Wroten, 1972). Laws prohibiting this behavior were nearly impossible to enforce. Today, storms occasionally expose shipwreck sites.

In 1833, the first Assateague Lighthouse was constructed to warn ocean travelers of the dangerous shoals offshore. Plans to replace the lighthouse with a taller, more powerfully illuminating brick structure were delayed by the Civil War. Construction was completed in 1867. The light subsequently was upgraded, and a separate oil storage building (1891) and new assistant keeper's house (1910) were built. In 1929, the keeper staff was reduced. In 1932, the lighthouse oil lamps were replaced by an electric lamp, and the original keeper's house was removed (Bearss, 1968).

Today the 1910 assistant keeper's house is used as seasonal staff residence. The oil storage building (Oil Shed) is used as an art gallery during summer months. The lighthouse and the oil shed are still owned by the U.S. Coast Guard. The lighthouse is on the National Register of Historic Places. The oil shed, seasonal residence, and the site of the original keeper's house may be eligible for nomination to the register.

To further protect ships and their crews from dangers of the sea, storms, and "wrecking", legislation was passed in 1874 to establish two life-saving stations on Assateague Island: the first near Green Run Inlet, MD, and the other at Assateague Beach near what is currently the Woodland Trail parking lot, but what was then the southern point of the island (see Figure 18). Two other stations were built near Popes Island, VA (1878), and at North Beach, MD (1883). All stations were operated by the Life-Saving Service. Dedicated surfmen lived with their families near the stations and patrolled the beaches regularly to signal warnings if ships came too close. They also rescued crews and protected ships and cargoes if disaster struck. The Life-Saving Service was abolished in 1915, when the U.S. Coast Guard took over responsibilities.

In 1922, the original Assateague Beach Life-Saving Station was replaced by a new station near what was then the southern tip of the Hook. Also listed on the National Register of Historic Places, the new Assateague Island Coast Guard Station was decommissioned in 1967. It is currently owned by the NPS. The Popes Island Life-Saving Station, just south of the state boundary, was decommissioned in 1953. The buildings were destroyed by fire in 1970.

With construction of the lighthouse, development of oyster and other commercial fisheries, and continuation of grazing, Assateague Village became established north and east of the lighthouse. The population grew to 225 by the turn of the century and supported a school, store, and churches.

By 1915, not counting the lighthouse keepers and their households, there were 25 to 30 families in Assateague Village. The village's decline commenced about 1922, after Dr. Samuel B. Fields of Baltimore acquired most of the land on the Virginia portion of Assateague Island. Fields had his land east of the reservation fenced and posted. His overseer, Oliphant, who lived in a bungalow across the road from the old Life-Saving Station, refused to permit the villagers to cross Field's property to get to Toms Cove. With their access over the shell road to the cove closed, the villagers began to move off the island. Their houses were jacked up, placed on skids, and taken to the waterfront. There they were placed on barges and floated across Assateague Channel to be relocated on Chincoteague Island.

The last person to leave the village was Bill Scott, who had operated the village's one general store (Bearss, 1968). Today the village site is marked only by some building foundations and a cemetery.

In 1912, the Seaboard Oil and Guano Company opened a fish oil plant on Toms Cove. Operating on a seasonal basis (May to November), workers processed fish into oil and fertilizer. The factory burned in 1916. Building remains are still evident just south of the overwash zone on Toms Cove Hook. A second fish factory, located about a quarter mile west of the first, was built in 1919 by the Conant Brothers of Chincoteague. The plant was closed "in 1928 or 1929, because the cove had silted up so badly that ships could no longer tie up at the dock" (Bearss, 1968).

In 1943, the S.B. Fields family, principal land owners on Assateague Island, sold their property to the U.S. Government for use as a National Wildlife Refuge.

## **Past and Future Management Perspective**

Chincoteague National Wildlife Refuge was established in 1943 for use as an inviolate sanctuary, or for any other management purpose, for migratory birds.

At the time of the original acquisition, primary recognition was given to southern Assateague Island's value as important habitat for migrating and wintering greater snow geese. While the refuge continues to provide important waterfowl habitat, the management emphasis has expanded over the years to address a variety of other wildlife needs.

Today, Chincoteague NWR supports breeding populations of the endangered Delmarva Peninsula fox squirrel and threatened piping plover. A nesting tower on the refuge has supported a resident pair of peregrine falcons, also an endangered species, since 1982. Additionally, hundreds of peregrine falcons stop on the refuge during migration.

Chincoteague is also one of the top five shorebird migratory staging areas in the United States, east of the Rocky Mountains (Manomet Bird Observatory, 1985). In 1990, the barrier islands which make up Chincoteague NWR along with other barrier islands of the eastern shore of Virginia and Maryland were designated an International Shorebird Reserve due to having over 500,000 shorebirds stop annually; this barrier island chain was cited as supporting the second highest number of different species east of the Rocky Mountains. This coastal barrier island/lagoon system has also been designated a World Biosphere Reserve by the United Nations Educational, Scientific, and Cultural Organization in recognition of its great ecological value, and the Department of the Interior has designated the area a National Natural Landmark in recognition of its outstanding natural values.

The refuge also provides an important education and recreation resource for people attracted to the beautiful beach and excellent wildlife viewing opportunities. Visitation has increased sharply since construction of the bridge from Chincoteague Island in 1962 and inclusion of refuge lands within Assateague Island National Seashore in 1965. According to refuge records, public use has grown from an estimated 100,000 visits in 1963 to more than 1.5 million visits in 1987, ascribing to Chincoteague NWR the third highest number of visits of any national wildlife refuge in the country (Aiken, 1987). Since peaking at 1,568,000 visits in 1987, refuge visitation has decreased steadily to 1,366,990 visits in 1990 (Refuge Records) with a slight increase to 1,394,128 in 1991 and another drop to 1,247,170 in 1992.



# DESCRIPTION OF ENVIRONMENT

Certain lands on Chincoteague, Assateague, Assawoman, Metompkin, and Cedar Islands, and other lands along the east coast of the Delmarva Peninsula, are covered under this plan. The physical and biological characteristics of the islands are, in many respects, unique when compared to the mainland; therefore, the description of the natural environment affected by the Master Plan focuses on the character of the immediate refuge vicinity.

## Climate

The climate of the Delmarva Peninsula is generally temperate and humid. Seasonal temperature ranges are influenced by the moderating effects of the Peninsula's proximity to Chesapeake Bay and the Atlantic Ocean. The area lies in the zone of prevailing westerlies, where most weather systems track west to east. The low relief and Atlantic exposure of Assateague Island make it extremely susceptible to storms.

The hurricane season runs from June through November (see Table 1). Summer season hurricanes originate over the Atlantic in the vicinity of the Bahamas, Leeward, or Windward Islands (The Nature Conservancy, 1976). Storm centers usually remain offshore, bringing heavy rains, high winds, high tides, and rough seas. Later in the season hurricanes tend to originate in the Caribbean. Losing much of their force as they travel across the southeastern states, they still carry a potential for devastating effects.

Summer days are typically hot and humid. Occasional thunderstorms hit with little notice, presenting danger of lightning strikes and exposure to beach goers. Although autumn days are typically cool and clear, the season also marks the onset of northeasters. These low pressure systems move up the coast, generating storms caused by counterclockwise cycling of moist air. Northeasters are characterized by heavy rain, strong northeast winds, high tides, and rough seas. Conditions may last for two to five days. Winter temperatures tend to be mild. Although snow is not uncommon, it rarely accumulates. Northeasters are most intense in winter, and carry the greatest potential for overwash of the primary dunes along the ocean side of Assateague Island.

**TABLE 1. TWENTIETH CENTURY HURRICANE HISTORY of VIRGINIA**

- 1903 October 10 - Average five-minute wind speed at Cape Henry 74 mph; Norfolk tide reached nearly 9 feet above Mean Low Water. One death.
- 1924 August 26 - Average one-minute speed 72 mph at Cape Henry. One death.
- 1924 September 30 - Fastest one-minute speed in Norfolk 76 mph.
- 1926 August 22- Average one-minute speed at Cape Henry 74 mph.
- 1928 September 19 - Average one-minute wind speed at Cape Henry 72 mph. The tide reached 7.06 feet above Mean Low Water in Norfolk. One death.
- 1933 August 23 - This hurricane established the record high tide for the area, 9.69 feet above Mean Low Water. Eighteen people lost their lives. The highest one-minute wind speed in Norfolk was 70 mph; 82 mph at Cape Henry, and 88 mph at NAS, Norfolk.
- 1933 September 16 - The highest one-minute wind speed was 88 mph at NAS, Norfolk, 75 mph at the NWS in downtown Norfolk, and 87 mph at Cape Henry. The tide was 8.15 feet above Mean Low Water.
- 1936 September 18 - The highest one-minute wind speed was 84 mph at Cape Henry and 6 mph in downtown Norfolk. The tide reached 9.19 feet above Mean Low Water and is the second highest tide of record.
- 1944 September 14 - The highest one-minute wind speed was 134 mph at Cape Henry which is the highest speed of record in the Hampton Roads area. Gusts were estimated to 150 mph. The Weather Service off ice downtown Norfolk recorded 72 mph with gusts to 90 mph.
- 1953 August 14 - **BARBARA** The highest one-minute wind speed was 73 mph at Cape Henry, 63 mph with gusts to 76 mph at Norfolk Airport. One death.
- 1954 October 15 - **HAZEL** The Airport's highest recorded one-minute wind speed, 78 mph. Gusts were estimated to 100 mph. A reliable instrument in Hampton recorded 130 mph.
- 1959 September 30 - **GRACIE** Passed through western Virginia; 6.79 inches of rain in 24 hours.
- 1960 September 12 - **DONNA** Highest one-minute wind speed at the Airport was 73 mph, 80 mph at Cape Henry and estimated 138 mph at the Chesapeake Light Ship. The low pressure of 28.65 inches is the lowest ever recorded in a tropical storm. Three deaths.
- 1964 September 1 - **CLEO** A storm noted for its rain, 11.40 inches in 24 hours which is the heaviest 24 hour total since records began in 1871.
- 1971 August 27 - **DORIA** Highest one-minute wind speed was 52 mph at the Airport and 71 mph at the NAS, Norfolk. A tornado touched down in Chesapeake.
- 1979 September 5 - **DAVID** Passed through central Virginia but spawned two severe tornadoes, one in Newport News with over two million dollars damage and one in Hampton with a half million dollars damage.
- 1985 September 27 - **GLORIA** Passed 45 miles off Cape Henry around 5 a.m. Highest one minute wind speed WNW 46 mph, peak gust WNW 67 mph at the Airport. South Island WNW 92 mph G 104 mph. Highest tide 5.2 feet above Mean Low water, storm rainfall total 5.65", total Virginia damage 5.5 million dollars.
- 1986 August 18 - **CHARLIE** Passed 30 miles off Assateague Island. Highest winds 51-63 mph, peak gust NNE 119 mph at mouth of Chesapeake Bay. No damage or flooding.

Source: U.S. Department of Commerce, no date.



Monthly precipitation records indicate no predictable seasonal pattern over the past 12 years (see Figure 3). Annual totals range between 30 and almost 60 inches, with an average of about 38 inches per year.

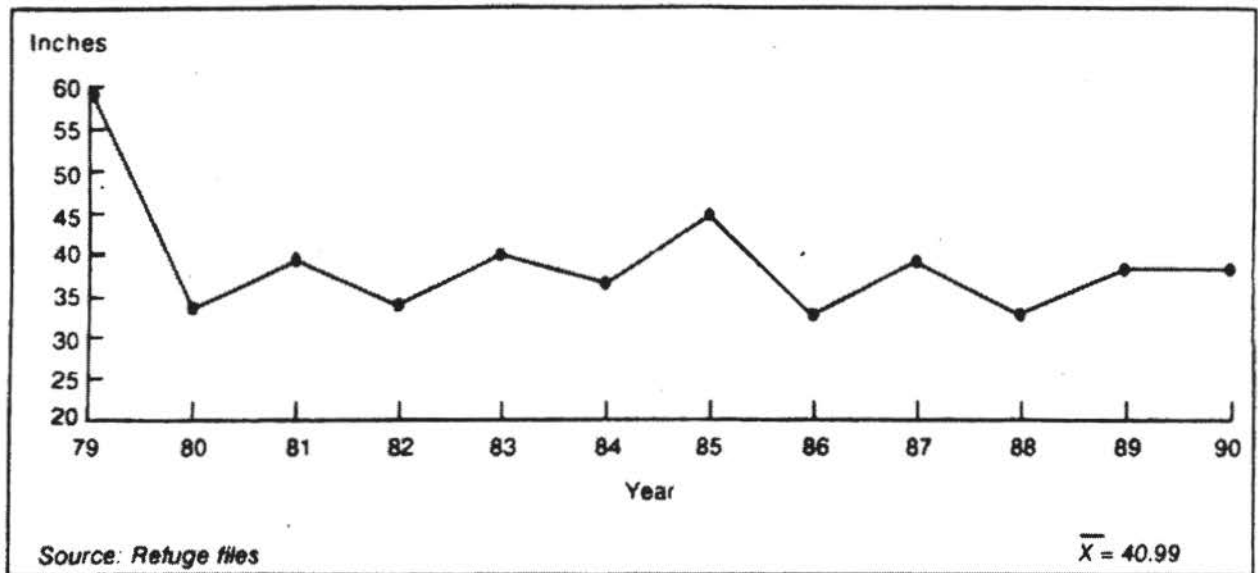


Figure 3. Total Annual Precipitation from 1979-1990

## Geology

The sand and mud surface of Assateague is underlain by 4500-7500 feet of discontinuous layers of sand, gravel, and clay that have accumulated during 135 million years of continental erosion and coastal action (Sinnott and Tibbitts, 1968).

The Delmarva Peninsula coastline has changed dramatically since the retreat of the last glacial ice sheets about 14,000 years ago. Sea level has risen more than 300 feet and the shoreline has shifted approximately 50 miles to the west. Sea level continues to rise at a local net rate of 2 mm per year (8 inches

per century), submerging the continental shelf and shifting barrier islands landward and upward. Ocean currents continue to transfer sands along the coast, reshaping islands and carving inlets to channels and bays behind the barriers.

Assateague Island is more than 37 miles long today (the longest barrier island on the Delmarva coast); however, inlets have divided it several times over the past few centuries. Geological research suggests that the southern portion of Assateague Island has developed as a series of recurved spits deposited by currents that erode the sands from northern beaches (Goettle, 1978). Historical maps of the island indicate Toms Cove Hook is a sand spit that accreted since the 1850's (see Figure 4).

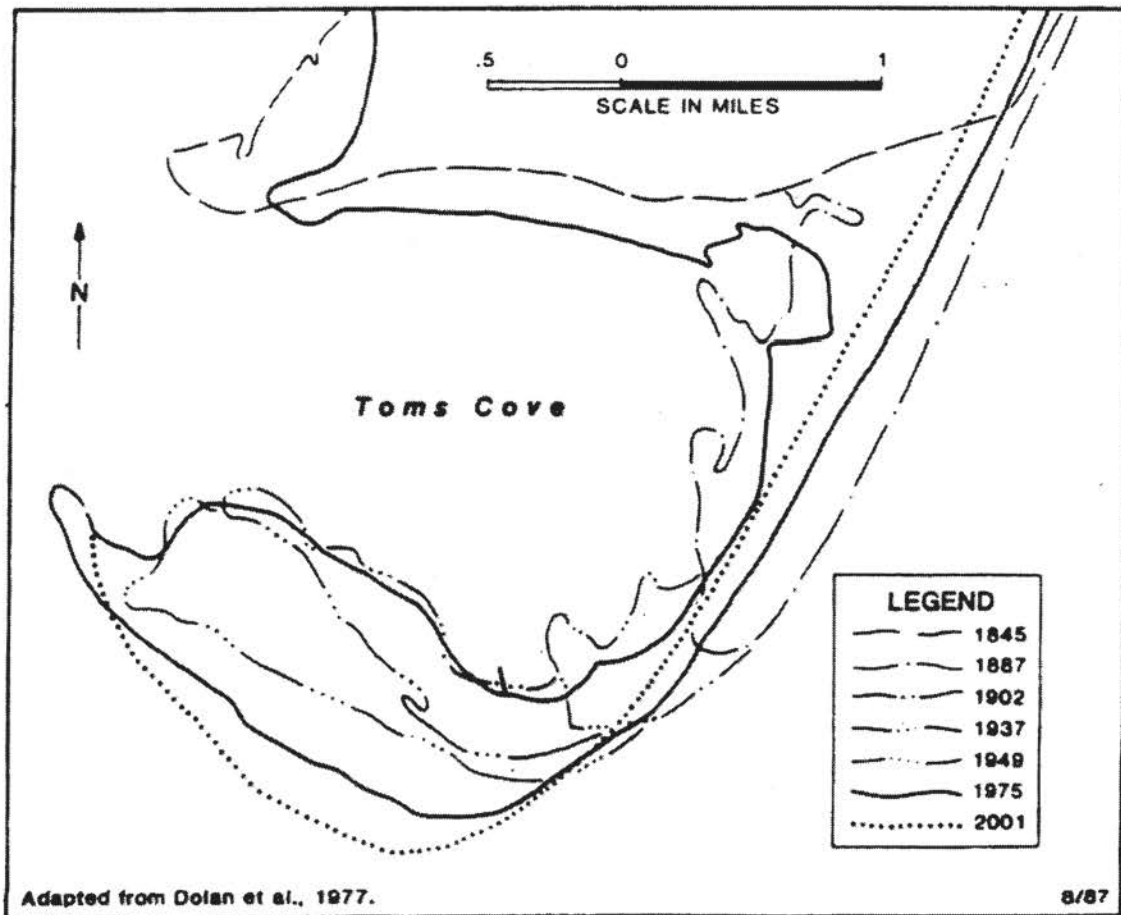


FIGURE 4. *Changing Shoreline of Southern Assateague Island*

Assawoman Island is approximately 2.5 miles long and in recent years joined to Wallops Island when Assawoman Inlet closed; currently the south tip of Assawoman has been cut by an inlet. Metompkin Island is 6.6 miles long and is also cut by an inlet. Cedar Island is 6.5 miles in length. Since Cedar Island does not have a large offshore sand supply similar to the other islands, it is moving westward at a greater rate than the other islands in the refuge.

## Barrier Island Processes and Geomorphology

Barrier islands are coastal features composed of sand and other loose sediments transported by waves, currents, storm surges, and winds. They are formed by sediments eroded from glacial deposits, or from ocean bottom sediments and/or coastal plain materials (see Figure 5). By definition, barrier islands protect other features, such as lagoons and salt marshes, from direct ocean wave attack.

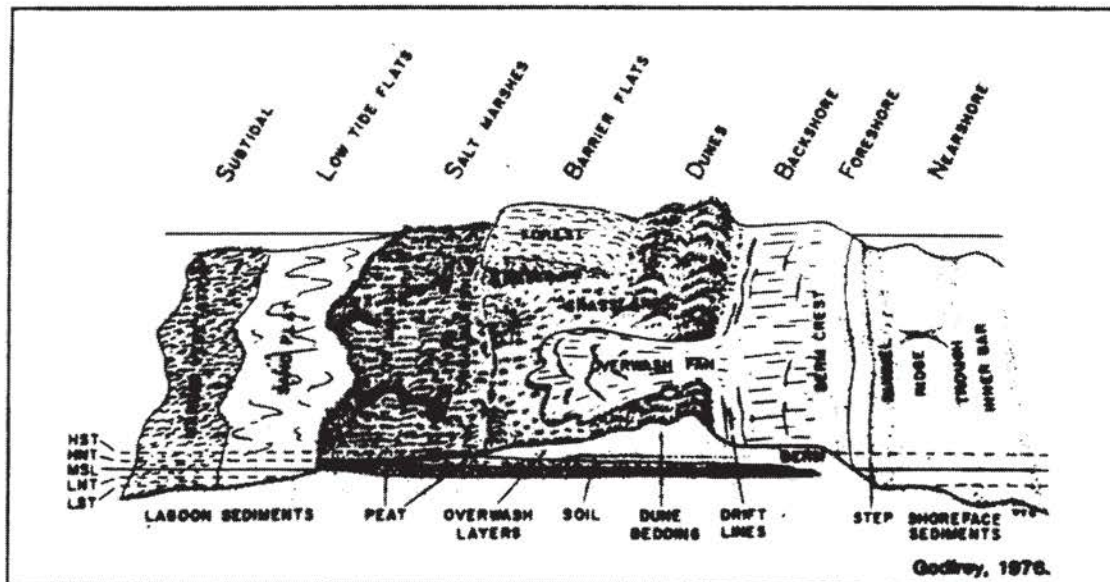
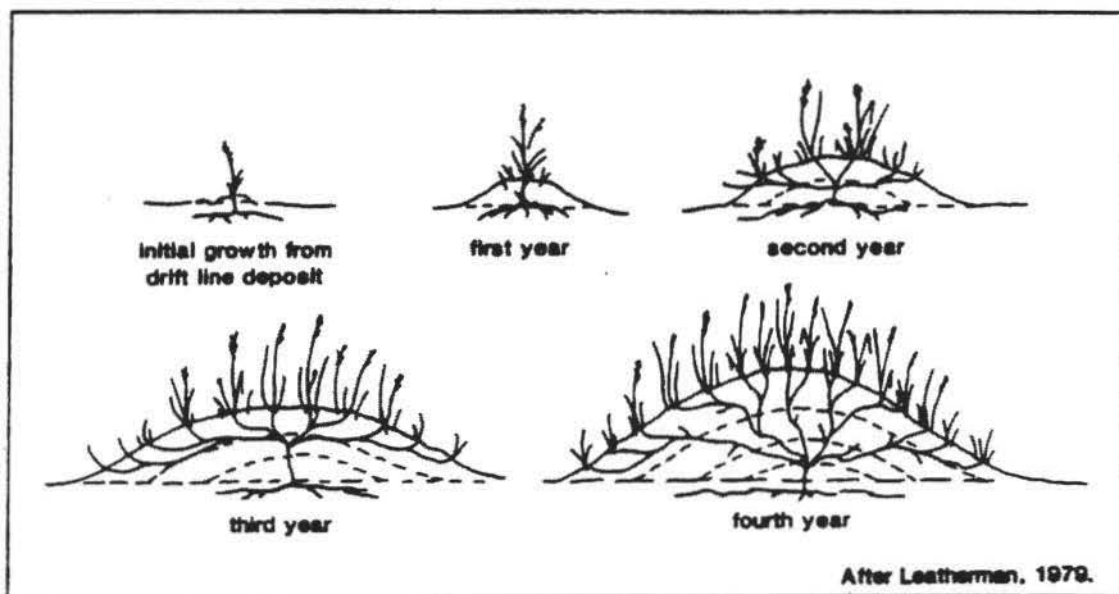


Figure 5. Barrier Environments

The nearshore zone is an area of wave turbulence and littoral drift where constant ocean currents and wave action create sand bars and shallow troughs that are exposed at low tide. Longshore currents move from north to south, transporting sands to Toms Cove Hook, where they accrete on bars and flats.

Accreting spits, like Toms Cove Hook, are often sites for beach ridge development. Longshore currents and waves build new platforms of sand (i.e., beach), and organic debris accumulates on the beach crests. As sands continue to build, plants grow from buried drift lines, accumulating more sand in curved ridges corresponding to the original drift line position. Continued shoreline accretion builds more curvilinear ridges. The resulting spit displays a system of ridges with upland vegetation; between them, low interdunal areas support wetland species.

The beach is the transition area between marine and upland environments. The intertidal foreshore is flooded and exposed by daily tides; the backshore, separated from the foreshore by a berm, or terrace, is subject to storm waves. Broken rhizomes and beach plant seeds, along with other organic debris, accumulate in drift lines along the backshore. Windblown sands are caught in this debris and build up around sprouting plants. Capable of surviving sand burial, beach grasses grow with the accumulating sand (Figure 6), providing a relatively stable substrate and facilitating dune development. Erosion by storm action or other interference often precludes this process.



*Figure 6. Growth and Development of a Beachgrass Dune*

In the absence of vegetation, wind removes sand and prevents the formation of stable dunes. As waves deposit sand on the beach backshore, winds move the sand farther inland or back out to sea, depending on the prevailing wind direction. When favorable dune development conditions exist, dunes grow higher and wider, eventually coalescing into a line parallel to the shore. Conditions are not usually so favorable on Assateague Island. As sea level rises slowly, ocean forces continually prod the shoreline westward. Strong waves and storm surges can erode entire beaches back to the dune line, or break through this protective barrier and overwash sand and salt water onto back dunes, flats, or wetlands. Dune location is determined by the frequency and extent of storm erosion, and the rate at which prevailing winds and vegetation can rebuild dunes.

After a March 1962 northeaster destroyed most of Assateague Island's natural foredune, an artificial dune was created along the entire length of the island. From 1962, the refuge dune system ranged from non-existent in the overwash area on Toms Cove Hook, to well-developed in the vicinity east of Old Fields Impoundment. In January 1992, a northeaster destroyed much of the dune line on the lower portion of the island and greatly reduced the primary dune line to the north.

At Chincoteague NWR, overwash occurs with increasing frequency along the Spur Road on Toms Cove Hook. Since construction in the 1960's, this dune-protected paved road extended south along the spur to an ORV beach access point. By the early 1980's the dune had eroded and the road was washed out repeatedly. Overwash is now common between autumn and spring, when northeasters and prevailing winter winds scour the shoreline; more than a dozen significant incidents were recorded during the 1986-87 season. Storm systems combined with monthly cycles of highest (spring or lunar) tides send sand-filled waves over the beach, scouring everything in their paths, moving huge loads from the ocean shoreline, and depositing them in the coveside overwash fan. In summer, these events are rare. Prevailing winds blow sand from the overwash fan back to the beach and littoral currents bring new sand from the north to further rebuild the beach face. Storm overwash has also occurred at numerous points along the north beach, sending sand and saltwater into the back dunes and barrier flats.

To protect impoundments and public use facilities from overwash and storm surges, refuge management attempts to maintain the dune line in certain critical areas by planting beach grass, using fencing as wind breaks to encourage sand accumulation, and occasionally bulldozing into areas



susceptible to overwash. For instance, high seas from Hurricane Gloria (Fall, 1985) overwashed several portions of the dune line near Old Fields Impoundment and east of B Pool. These low gaps were filled in with sand before winter storms could cause more extensive damage. Following the 1992 storm, the refuge staff created about two miles of dunes to protect critical endangered species habitat.

Barrier flats have negligible relief and generally result when washovers or inlets destroy the original beach/dune ridge morphology. The Fish and Wildlife Service has graded and impounded large areas of barrier flats to create freshwater and brackish wetlands for waterfowl and shorebird habitat. The backdunes and barrier flats around the impoundments support grasslands and shrub/scrub thickets. Forests have developed on the barrier flats in the lee of the most protected dune areas.

Freshwater wetlands on Chincoteague NWR occur at natural low points in the dunes or flats, or, as described above, impounded areas. On Toms Cove Hook, low areas between the beach ridges and dunes collect rainwater and support wetland vegetation. A few other small natural freshwater marshes occur behind the dunes of the northern beach. The refuge's impoundments are discussed in a separate section of the affected environment.

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## **Soils**

The soils of barrier islands consist primarily of sand on uplands, and silty loams on tidal marshes and other wetlands. Accomack County is currently updating its soil classification system and map. Preliminary descriptions are summarized as follows:



Beaches: 0 to 10% slope, regularly flooded. This nearly level to moderately sloping unit consists of sandy sediments deposited by wave action. This unit is used primarily for recreation and wildlife habitat. Most other uses are limited by flooding with salt water, severe erosion, and accretion of sediments.

Assateague Fine Sand: 2 to 35% slope, rarely flooded. This gently sloping to steep soil is very deep and excessively drained. It is found on the island's dunes. This soil type is used primarily for wildlife habitat and recreation.

Loblolly pine productivity potential on this soil is moderately high, although some areas support only salt tolerant shrubs because of salt spray. Seedling survival is limited by moisture stress (very low water storage capacity).

Cultivated crops, pasture grasses, and legumes are all unsuited to this soil. Flooding by salt water, low availability of fresh water, and erosion by water (slight) and wind (severe) are limitations.

Fisherman Fine Sand: 0 to 6% slope, occasionally flooded. This nearly level to gently sloping soil is very deep and moderately well drained. It is located in depressions and on undulating areas (back dunes) associated with dunes and marshes on Assateague and Chincoteague Islands. This soil is primarily suited to wildlife habitat and recreation use. Some areas are in woodland. Suitabilities for other uses are similar to those described for Assateague Fine Sand.

Camocca Fine Sand (proposed series name): 0 to 2% slope, periodically flooded. This nearly level soil is very deep and poorly drained. It occurs in shallow depressions between coastal dunes and on nearly level barrier flats between dunes and marshes. This soil is also used mainly for wildlife habitat and recreation. Some areas support sparse stands of native pines and hardwoods. Where salt water flooding is more frequent, this soil supports a wax myrtle-dominated shrub community. Suitabilities for other uses are similar to those described for Assateague Fine Sand, with additional limitations of wetness.

Chincoteague Silt Loam: 0 to 1% slope, frequently flooded. This level soil is very deep and very poorly drained. It is located in refuge impoundments and in salt marshes primarily between the barrier islands and the seaside mainland. Some barrier tidal flats are included. This soil is used for wetland wildlife habitat and spawning grounds for shell and finfish species. Cultivated crops, nursery stock, pasture grasses and legumes, and loblolly pines are all

unsuitable on this soil because of flooding by salt water, wetness, excess salt, and ponding. Construction is similarly unsuitable with additional limitations of low strength and potential groundwater pollution.

All of these soils are intermingled in many locations on the Islands. Associated complexes recognized by the county soil scientists include Fisherman-Camocca and Fisherman-Assateague.

## **Surface and Ground Water**

No natural freshwater streams or lakes exist on Chincoteague Refuge. Rainfall and overwash are the only sources of surface water. Even the "freshwater" ponds and impoundments are slightly brackish to highly saline because of overwash or salt spray and accumulation of salt residue as freshwater evaporates. Evaporation and transpiration account for major surface water depletion during the summer months.

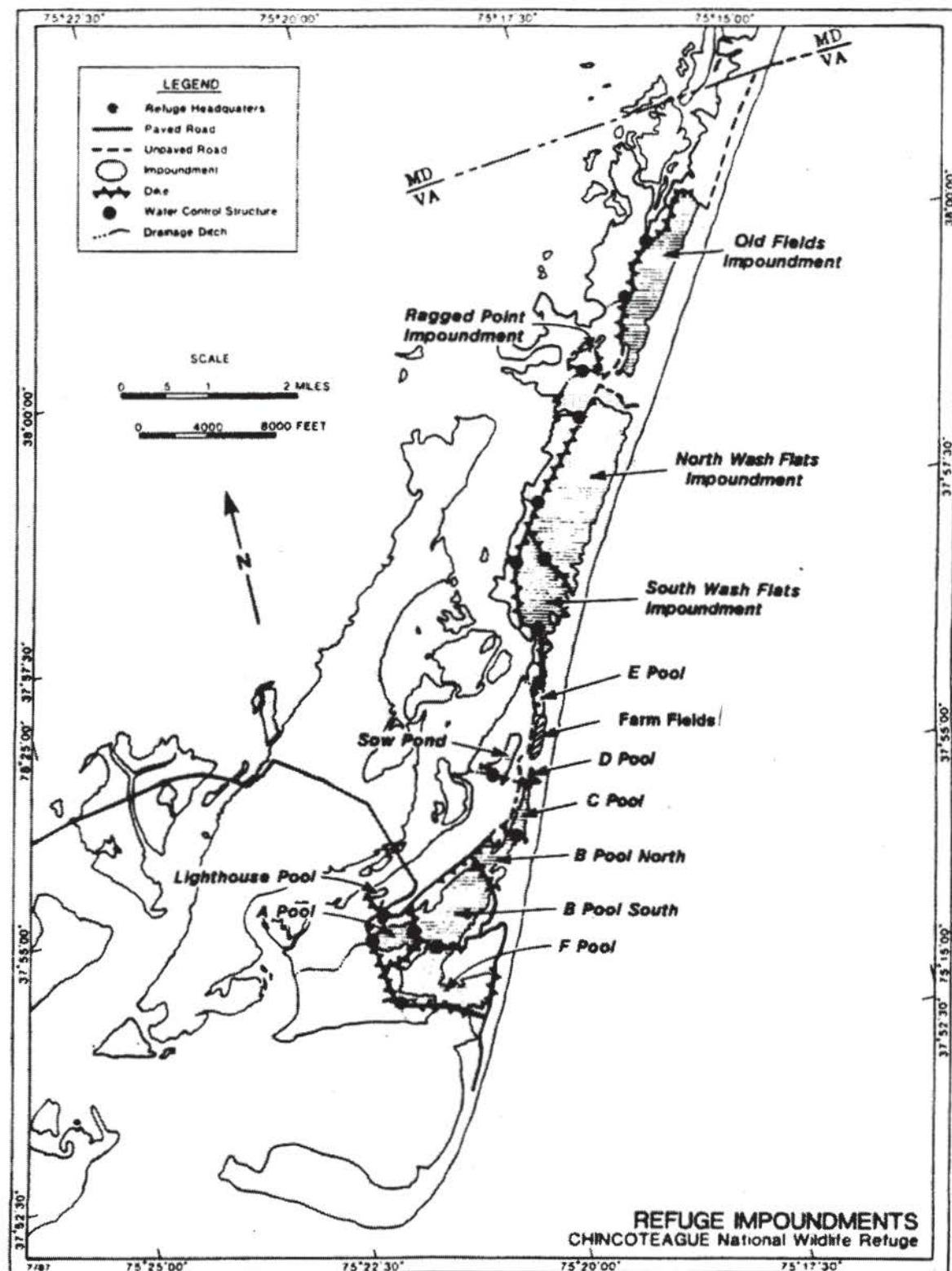
The fresh groundwater beneath the islands is brackish because of these same influences. It forms a lens-shaped layer that "floats" on underlying salt water. Existence and reliability of freshwater aquifers far below the island requires further investigation.

## **Refuge Impoundments**

Fourteen impoundments covering over 2,623 acres were constructed on the refuge to provide submergent and emergent wetland vegetation as forage for waterfowl and habitat for other waterbirds (see Figure 7). Management of these impoundments is directed at providing a variety of habitat types for many wildlife species.

A system of dikes confines these wetlands. Most dikes are also maintained as roads for public and/or staff access. Beach Road from the bend beyond the refuge headquarters to the rotary at the beach is a dike separating A Pool from the Black Duck Marsh and F Pool from Little Toms Cove. Approximately half of the Wildlife Loop is a dike surrounding B Pool South, separating it from A Pool, F Pool, and B Pool North. The dike between A and F Pools is a bike trail. The Swan Cove bike trail, connecting Wildlife Loop to Parking Lot 1 at the beach, is built on a dike separating F Pool from natural wetlands to the east.

FIGURE 7.





Most dikes have adjacent borrow ditches along their pool side. These ditches serve to:

- provide wading bird resting and feeding habitat;
- provide wading bird and waterfowl brood rearing habitat, an especially important function when drought or impoundment drawdown removes open water from other pool areas;
- facilitate drainage as flow channels to water control structures; and
- restrict visitors and some mammalian predators to dikes, minimizing intrusion into protected habitat;

Water control structures are used to manipulate impoundment water levels according to which species of plant or animal is being managed. These structures release water either into adjacent pools or through bayside channels into the tidal marshes. Impoundment water level control enables production of good quality wildlife food and assures a variety of wetland habitats for diverse species of wildlife.

In general, impoundments are located above high tide level so estuarine water cannot enter them; however, tidal influx can occur through the Virginia Creek WCS into Old Fields Impoundment. During severe weather and extreme high tides, some overwash reaches impoundments from the bay side; F Pool, Wash Flats, and Old Fields impoundments are most susceptible. Other than these cases, impoundment water supply comes from direct precipitation. Impoundments receive very little surface run-off because surrounding soils are highly permeable.

## **Vegetation**

This discussion of plant communities and vegetation types is based on The Flora and Ecology of Assateague Island (Higgins et al., 1971), A Botanical Survey of the Maryland Portion of Assateague Island (Hill, 1986), and CNWR Marsh and Water Management Plan (1986) (See Figure 8).

The least diverse of the island's upland plant communities is the beach. Considered pioneer species, beach plants are exposed to constantly shifting

sands, limited fresh water, temperature and wind extremes, and frequent salt water. The entire community can be covered by tidal surges. The beach extends from the intertidal zone into the dunes along the entire east and south sides of the island. Smaller areas are along Toms Cove and Assateague Point and Channel. The most common beach species are American sea rocket and sea lavender. Plant density varies from sparse in dry years to frequent in wet years.

A gradual transition to the dunegrass community occurs beyond the high tide line. Dunegrass establishes readily on the stabilized dunes as well as natural areas. The most characteristic species are American beach grass, saltmeadow cordgrass, seaside goldenrod, dune sandbur, rough buttonweed, carpetweed, and seabeach evening primrose.

Shrub community composition varies with groundwater supply, elevation, proximity to salt spray, and frequency of overwash or other flooding. In general, this vegetation zone extends north and south on barrier flats and backdunes, gradually merging on the east with dunegrasses and on the west with marshes or forests. Deciduous trees, shrubs, and vines are predominant plant forms. Common species include black cherry, common persimmon, Canada serviceberry, northern bayberry, blackberry, poison ivy, and greenbrier. Evergreens are less frequent, including wax myrtle, red cedar, and American holly. Most of these shrub species also occur to a lesser degree in the forest community.

Hudsonia, or false heather, is the dominant species in localized areas within the shrub community. Hudsonia forms large mound-shaped colonies on low interior dunes that are generally very dry and free of salt spray. This plant is an important dune stabilizer, capturing windblown sands.





The upland forest community that occurs in several large stands on stable dunes, generally west of shrub areas and impoundments, indicates parts of the island that have been stable for the longest time.

Approximately 1,500 acres on the refuge are classified as upland forest. Most stands are pure, or almost pure, loblolly pine. Mixed loblolly pine and hardwood stands contain red, white, and water oak as the most abundant hardwoods. Other hardwood species found include red maple, sweet gum, sassafras, black gum, black cherry, American holly, wax myrtle, black willow, and persimmon. Understory vegetation is composed of dogwood, blueberry, blackberry, greenbrier, poison ivy, common chokecherry, and fox grape. Many of the rarest plants on the island are found in the forests, including indian pipe, crested yellow orchid, spotted wintergreen, and partridgeberry, among others.

Most of the forested areas on the refuge are more than 40 years old. Advanced age and overstocking are factors contributing to slow growth and declining vigor of trees. When occurring over a substantial area, these conditions increase forest susceptibility to attack by insects and disease. Single species stands are also vulnerable because a single agent (insect or disease) can affect all or most of the trees in an area.

A major infestation of Southern pine beetle, an insect that attacks southern yellow pines (including loblolly pine), began at Chincoteague in 1982. Drought conditions are believed to have increased vulnerability of overstocked and/or overmature stands. Stands were further weakened by a September 1985 hurricane, and spread of the insect damage accelerated in 1986. One 1983 outbreak destroyed a 60-acre stand before it was controlled. Although overstocked, good stands of loblolly pines have become established on portions of this tract.

Loblolly pine is a shade-intolerant tree requiring full sunlight to establish new stands. Loblolly pines produce cone crops in as little as ten years, although seed production is greater in older trees. Thinning of stands has been shown to increase production of cones and seeds by dominant and codominant trees.

Recent efforts to regenerate areas clearcut after insect attack have been hampered by severe damage to seedlings by browsing white-tailed deer and sikas. These animals are especially fond of hardwood seedlings planted to increase diversity of forest species, but some planted seedlings and saplings have survived.



The freshwater wetlands on Assateague Island are actually brackish, although they are inhabited by plants with limited salt tolerance. The fresh marshes have a history of salt water intrusions. Forested wetlands occur on the west side of B Pool, in the vicinity of the Woodland Trail, and in lowlands near the White Hills. Dominant species include red maple, black willow, wax myrtle, ferns, and blueberries. A more open transitional fresh marsh that borders uplands and saltmarshes on the bayside of the island includes phragmites (common reed), eastern baccharis, cattails, wax myrtle, swamp rose, and American elder. Salt tolerant natural freshwater marshes in low areas on barrier flats support few woody species. Characteristic plants include linear-leaved loosestrife, swamp rose-mallow, rushes, umbrella-grass, and Virginia buttonweed.

The regularity of tidal flooding influences the distribution of salt marsh plants. Salt meadow cordgrass is the dominant species in the low marsh, the zone between mean high tide and mean low tide. Salt marsh cordgrass mixed with spike grass and saltwort grows in the less frequently flooded high marsh, while northern sea-lavender and saltbush occur at highest levels. Marsh elder dominates the marsh/upland edge.

## **Wildlife**

### **Endangered Species:**

Bald eagles are occasional refuge visitors; as their Chesapeake Bay population increases, use of the refuge for feeding and resting will also increase. Historically, eagles have nested along the mainland shore of Chincoteague Bay; however, nesting potential on the refuge is low due to limited suitable habitat.

A pair of peregrine falcons have nested in a tower near the North Wash Flats impoundment since 1982, producing usually 2 to 4 young annually, with the exception of one. The tower was built for a "hacking" program conducted in 1980 and 1981. Peregrine young were transplanted to the tower where they were fed and closely monitored through fledgling stage. No other suitable peregrine nesting habitat is available on the refuge.

Chincoteague NWR is one of the prime eastern U.S. focal points for observing arctic peregrine falcons during their autumn migration. The Wash Flats

impoundments and the protected north beach provide resting and feeding habitat for an estimated 875-900 peregrines, who may stop over on the island for a day to several weeks. An international banding program indicates that more than half the peregrines observed at the refuge during the fall migration originate in Greenland, with others coming from Quebec, the Northwest Territories, and the Yukon. Some of these peregrines travel as far south as southern Argentina.

The Delmarva Peninsula fox squirrel is an endangered species inhabiting the refuge's loblolly pine forests. Fox squirrels can be commonly seen in the headquarters area and around the Woodland Trail. Their coloring is similar to the gray squirrel, but the fox squirrel is larger with a bushier tail and is more terrestrial than the gray squirrel.

The Delmarva Peninsula fox squirrel's original range stretched from central New Jersey south through eastern Pennsylvania and down the length of the Delmarva Peninsula. As woodland has been cleared for farming and altered by forestry, available fox squirrel habitat has dwindled, and the known population has been reduced to several sites in Maryland, Delaware, and the Chincoteague NWR in Virginia (USFWS, 1983). The refuge population was translocated there in the early 1970's. Over the past few years their numbers on the refuge have stabilized. Some fox squirrel offspring were translocated from the refuge to other optimum habitat within their former range as part of the ongoing Recovery Plan (USFWS, 1983).

On the refuge, Delmarva Peninsula fox squirrels live in forest stands predominated by mature loblolly pines. In other parts of its range, the fox squirrel is usually found in mixed stands of mature hardwoods where a variety of mast-producing trees ensure a reliable food source. With its terrestrial habits, the fox squirrel is adapted to a park-like, open understory and is rarely found in dense underbrush, although production in areas with a developed understory has been observed on Chincoteague NWR.

Because they spend so much time on the ground, road accidents are a mortality factor of the Delmarva Peninsula fox squirrel. Major natural predators are red fox, raccoon, and great horned owl.

Refuge forest management and predator control objectives are designed to provide optimum fox squirrel habitat. Specific practices include:

- Maintain open understory in specified areas.
- Provide nesting boxes to supplement natural tree cavities.
- Reduce competition with gray squirrels by relocating grays off-island.
- Protect from hunting and natural predation. Prohibit pets from island.
- Supply reliable food source through management of vegetation.

A Master's thesis, Habitat Utilization, Population Dynamics and Long-term Viability in an Insular Population of Delmarva Fox Squirrels by Bonnie Larson and completed in 1990, concludes that among others the following are important in managing the squirrels on the refuge: forest corridors connecting forest tracts should be increased and maintained; and an adequate and year-round food supply may be more important in sustaining populations than using prescribed burning or other management practices to open up the understory if they also serve to destroy food resources.

### **Threatened Species:**

The piping plover, a threatened species protected under the Endangered Species Act since January, 1986, nests on sandy or cobbly beaches and washovers.

In 1985, 16 to 18 pairs of plovers nested on Chincoteague Refuge, producing a total of 21 young. The refuge supports one of the largest concentrations of piping plovers along the Atlantic coast. Of 24 nesting attempts documented, 19, or about 79%, occurred on the Hook, but only seven young, or a third of the refuge's total production, were successfully fledged there.

In spring of 1986, a cable was erected next to the ORV corridor on Toms Cove Hook to mark a nesting exclosure, barring all human entry to the upper beach and dunes along most of the refuge's ORV use zone during the nesting season. Only 6 pairs of nesting plovers were found on the refuge in 1986; however, this reflects a lower intensity of survey effort rather than a real drop



in the nesting population. In 1987, 46 pairs of plovers nested on the refuge; however, again production on the Hook was very low, as only three chicks fledged. The lower 2.5 miles of the Hook were closed to all public use during the 1988 nesting season; the result of the closure and an intensified predator control program was that 26 plover chicks were fledged on the Hook in 1988. In 1991, 38 pairs of plovers were found on the refuge with 30 being fledged, and in 1992, 36 pair fledged 19. (CNWR Reports, 1988, 1989, 1991, 1992).

In Virginia, piping plovers begin displaying territorial behavior in mid-March. Following elaborate courtship rituals, the pair forms a shallow depression in the sand to serve as a nest. Usually four eggs are laid. The eggs hatch in about 25 days, and the downy young are soon able to follow their parents in foraging for marine worms, crustaceans, and insects, which they pluck from sand and mudflats in the intertidal zone.

Both eggs and young are so well-camouflaged that they are apt to go undetected. When predators and other intruders come close, the young squat motionless on the sand while the parents attempt to attract the attention of the intruders to themselves, often by feigning a broken wing. Surviving young fly in about 30 days.

Stormtides, predators, or human activity often disrupt nesting before the eggs hatch. When this happens, fledglings from late nesting efforts may not fly until mid-August. Plovers commonly gather in groups on undisturbed beaches prior to their southward migration.

The following factors which contributed to the decline of the piping plover along the Atlantic Coast also depress plover production at Chincoteague:

- Human disturbance often curtails breeding success. Pedestrians and off-road vehicles may crush the well-camouflaged nests or young. Excessive disturbance may cause plover parents to desert the nest, exposing eggs or chicks to the summer sun and predators. Interruption of feeding may stress juvenile birds during critical periods in their development.
- Trash left by refuge visitors attracts predators such as raccoons and foxes. Gulls, which have dramatically increased in numbers along the Atlantic Coast over the last 20 years, also prey on plover eggs and chicks. At Chincoteague NWR, egg predation by red fox, raccoons and fish crows has resulted in substantial nesting failures. Predator control and nest

exclosures have virtually eliminated loss of eggs and chicks to raccoons; however, although only 13 eggs were lost directly to predation in 1991, 13 piping plover nests were abandoned due to harassment by red fox (Cross, 1991), and in 1992, 9 chicks were lost to fox (CNWR Report, 1992).

The Atlantic loggerhead sea turtle is a threatened species that nests rarely on the refuge, occurring at intervals of about once every five years. Historically Assateague Island has been the northern end of this large (up to 900 lbs.) sea turtle's range. Female loggerheads bury their eggs to incubate in the beach ridge. Researchers believe sand temperatures at Chincoteague are probably not warm enough to produce viable young (Nickerson, Chief Endangered Species, USFWS, R-5). An experimental egg transplant and monitoring program, conducted from 1969 to 1978, was unsuccessful at re-introducing regular nesting activity (CNWR, no date).

### **Birds:**

Chincoteague Refuge is renowned for its abundant, diverse bird habitat. More than 300 species are known to use the refuge regularly for nesting and brood rearing, feeding, resting and staging during migration, or wintering. Most conspicuous are the seabirds, shorebirds, wading birds, raptors, and waterfowl. Specific management practices encourage these groups as well as many passerine species to use the refuge.

### **Waterfowl:**

The impoundments at Chincoteague Refuge provide habitat for goose, duck, and swan use year-round. Water level management and vegetation control are conducted to maintain nesting and brood rearing habitat. Waterfowl production success is highly dependent on an adequate water supply (i.e. rainfall).

Nesting waterfowl species include wood ducks, American black ducks, mallards, blue-winged teals, gadwalls, Canada geese, and mute swans.

Black duck management is a high priority throughout their range because of declining populations and hybridization with mallards. Breeding and wintering habitat quality on the refuge is enhanced by controlling phragmites and wax myrtle in favor of vegetation with higher wildlife food value, such as three

square, spikerush and red root cyperus. Human disturbance is discouraged in black duck nesting areas. Although Chincoteague NWR is south of the major black duck breeding range, an estimated 40-200 young are produced annually depending on impoundment conditions.

The refuge lies within the Atlantic Flyway for waterfowl (see Figure 7). Dozens of waterfowl species stop to feed and rest on Chincoteague's impoundments during the spring and fall migration seasons. The refuge supports wintering snow geese, Canada geese, black ducks, mallards, green-winged teal, northern pintail, northern shoveler, gadwall, American wigeon, bufflehead, red-breasted merganser, ruddy duck, tundra swan and others. A full listing of these species is maintained in refuge files. Assateague Channel and Toms Cove provide critical winter feeding habitat for brant, who use refuge impoundments for fresh water and resting.

Snow goose populations have recovered since the 1930's and 1940's when they were considered an endangered species. The refuge's current mid-winter snow goose population averages around 6,000 geese but can range as high as 13,000 for a few weeks. These birds loaf and rest in the protected refuge impoundments, and regularly feed in adjacent salt marshes and in agricultural fields on the mainland. Occasionally geese feeding activity is concentrated in particular salt marsh locations, uprooting salt marsh cordgrass, and creating muddy devegetated "eat-out" areas.

A resident population of approximately 35-60 mute swans nest in the impoundments. Although these birds are popular with refuge visitors for viewing and photography, they are an exotic (i.e. non-indigenous) species competing with native waterfowl for nesting space and food. In addition, their feeding habits increase the turbidity in the water, reducing the growth of submerged aquatics.

### **Marsh and Waterbirds:**

Management of refuge impoundments also enhances this habitat for wading birds. Species of egret, heron, and ibis frequent the impoundment borrow ditches, eating small finfish and eels. Glossy ibis, black-crowned night heron, green-backed heron, tricolor and little blue heron, several rail species, and great, snowy, and cattle egrets all feed in the refuge marshes. A heron, egret, and ibis rookery is located on several marsh islands in Chincoteague Bay. Other rookeries are located in the outer marsh fringe between Chincoteague Island and the mainland.

Grebes and loons winter at the refuge, resting, and feeding on adjacent waters.

The eastern brown pelican was recently removed from the list of species protected by the Endangered Species Act. Pelicans loaf on the refuge's sand and mudflats during the summer, feeding in Toms Cove, the ocean, and Assateague Channel. Pelicans nest in coastal areas south of the refuge; however, over the past few years they have nested progressively northward. Their increased presence in the Chincoteague area may lead to nesting on or adjacent to the refuge in the near future.

### **Shorebirds, Gulls, Terns, and Associated Species:**

Shorebirds have traditionally used the beach, flats, and marshes on and around Assateague Island. Since the establishment of CNWR, several hundred acres of shrubby back dunes and barrier flats have been converted into impoundments which provide premium shorebird feeding and resting areas. The combination of Assateague Island's natural assets and Chincoteague National Wildlife Refuge's wildlife habitat enhancement has established the area as one of eastern North America's most important shorebird management areas.

In regards to numbers of shorebirds using an area during the southward migration, Chincoteague NWR ranks fourth among 454 sites where a census was taken in the U.S., east of the Rockies, and is important for many species on an international scale. The refuge ranked second in diversity of shorebird species from among all 450 sites in the International Shorebird Survey network (Manomet Bird Observatory, 1985), and in 1990 the barrier islands of Virginia and Maryland were dedicated as part of the International Shorebird Reserve.

The loss of shorebird habitat to development along the middle Atlantic coast causes unusually large concentrations of shorebirds wherever habitat is favorable. Chincoteague NWR is the only site between Forsythe NWR in New Jersey and Pea Island NWR, North Carolina that can regularly provide extensive shorebird resting areas at high tide, major feeding areas on freshwater flats, and undisturbed expanses of short vegetation for nesting (CNWR, 1980). Broad expanses of sandy beach for nesting and extensive intertidal feeding areas also entice shorebirds to Chincoteague Refuge.

Maximum numbers of shorebirds at the refuge occur during the north and south migrations (approximately May 1 - June 15 and July 15 - August 15,

respectively). Birds stop to rest and feed, primarily on the northern refuge ocean beach, the impoundments, and Toms Cove Beach. Refuge impoundment water management activities expose mud flats during the migration seasons, providing resting space even at high tide for shorebirds, gulls, terns, and skimmers. If water levels within the impoundments are either too high or low due to variable rainfall conditions fewer shorebirds use the refuge that year.

Intertidal sand and mud flats on the cove side of Toms Cove Hook abound with horseshoe crab eggs and other high quality food during the entire shorebird season.

The refuge provides excellent nesting habitat for colonial and other beach nesting birds. Colonial species include common, least, and gull-billed terns, and occasionally black skimmers. Wilson's and piping plovers nest on beach ridges and overwash areas (Assateague Island is the northern limit of Wilson's plovers' breeding range). Willets and oystercatchers nest on the cove side beach and around the natural freshwater marsh in the Hook interior. Oystercatchers also nest in the dunes and recently-vegetated areas within the nesting enclosure, especially near Fishing Point.

Herring, ring-billed and laughing gulls are the three gull species commonly seen during summer months. Great black-backed gulls spend winters in the area. Gulls nest along the causeway connecting Chincoteague Island to the mainland. They feed and rest along refuge beaches and in impoundments.

### **Raptors:**

Chincoteague Refuge's marshes and F Pool are fished heavily by ospreys, who typically nest on hunting blinds over open water in Assateague Channel and Chincoteague Bay. Osprey populations in the area have recovered from a decline caused by DDT and are once again abundant.

Red-tailed hawks nest in forests on the refuge. Large numbers of hawks stop to rest and feed during their fall migration, including kestrels, merlins, sharp-shinned, and Cooper's hawks. Three species of owls are year-round refuge residents. The eastern screech owl is a tree cavity nester, and is occasionally found in wood duck or Delmarva Peninsula fox squirrel nest boxes. Common barn owls often nest in hunting blinds in adjacent marshes. These owls usually eat small rodents and birds, while the larger forest-dwelling



great horned owl preys on an occasional rabbit, gray squirrel, or Delmarva Peninsula fox squirrel.

Turkey vultures are occasionally seen roosting in trees or flying over the refuge in search of carrion.

### **Other Birds:**

Northern bobwhite and American woodcock are two small upland gamebird species that nest regularly at Chincoteague. Bobwhites are native year-round residents, while woodcock are migratory. Forest management to control Southern pine beetle benefits woodcock by providing clear cut areas and early successional stages of forest regrowth, both of which are preferred habitat for nocturnal roosting.

The refuge bird list includes several dozen passerine species (small to medium sized perching songbirds, or "land birds") that nest on or migrate through Assateague Island. Some of the most common nesting passerine species are the red-winged blackbird, song sparrow, common yellow-throat, fish crow, gray catbird, pine warbler, and Carolina wren.

Small nesting boxes have been erected in several refuge impoundments for tree swallows, who feed on abundant populations of flies and mosquitoes.

### **Mammals:**

Thirty-one mammal species are known to live on Chincoteague NWR or in waters surrounding the refuge. The list of these species is maintained in refuge files.

### **Deer:**

White-tailed deer are the largest native land mammals on the refuge. Abundant in wooded areas and upland meadows, they are also attracted to Southern pine bark beetle infestation sites where dead trees have been cleared and tender regenerating forest vegetation is plentiful.

**Sika:**

Sika are much smaller (average adult weight 75 lbs) than white-tailed deer, and are characterized by their rich brown, often spotted coats. The species, an oriental elk, has flourished on Assateague Island since the 1920's when a few pair were released on the north end of the island. Like the white-tailed deer, sika are abundant in the refuge's woodlands and meadows and are especially attracted to new, early successional vegetation. They also frequent the marsh edges and are commonly seen from the Wildlife Loop, grazing in the wet scrub adjacent to B Pool.

**Ponies:**

The "Chincoteague Ponies" are descendants of colonial horses brought to Assateague Island in the 17th century by Eastern Shore planters (AINS, 1986 and Bearss, 1968) when crop damage caused by free roaming animals led colonial legislatures to enact laws requiring fencing and taxes on livestock (AINS, no date). The modern-day descendants of those domestic horses are wild and have adapted to their environment. Prior to the refuge's establishment, the Chincoteague Volunteer Fire Company purchased the ponies and continues ownership to this day.

A fence along the Virginia/Maryland State line (the northern refuge boundary) separates the island's ponies into two herds. The Maryland herd is owned by the NPS. The Virginia herd is owned by the Chincoteague Volunteer Fire Company, and grazes in two designated compartments on the refuge.

Following tradition, the Fire Company rounds up the entire herd (approximately 150 ponies) for the Annual Pony Penning and Auction held on the last Wednesday and Thursday of July; some foals and yearlings are sold at auction to benefit the town's ambulance and fire services.

**Other Land Mammals:**

Red fox are fairly common in brushy areas throughout the refuge. They prey on nesting waterfowl, terns, shorebirds, and other ground-nesting animals. Within the piping plover nesting areas, fox predation is a primary cause of low bird nesting success (CNWR, 1991). Raccoons are another common predator of nesting waterfowl and shorebirds.

Muskrats and river otters live in the refuge impoundments and surrounding salt marshes. Other small mammals found in various locations throughout the island include Virginia opossums, Eastern cottontails, Eastern gray squirrels, meadow voles, least shrews, and several species of mice, rats, and bats.

### **Marine Mammals:**

Marine mammals are often sighted in waters around the refuge, and occasionally wash onto shore. Species include: harbor seals; grampus; common blackfish; humpback, fin-backed, sperm, and pygmy sperm whales; spotted and Atlantic bottle-nosed porpoises; and common dolphins.

### **Reptiles and Amphibians:**

Several species of turtles, snakes, toads, and frogs live on the refuge. Eastern box turtles, painted turtles, and mud turtles are seen occasionally in the impoundments, as are snapping turtles, which can grow quite large (10-80 lbs.) and prey on young waterfowl (USFWS, 1976). Northern diamond back terrapin inhabit the salt marsh and more brackish impoundments.

No poisonous snakes are known to inhabit Assateague Island (USFWS, 1976). The most commonly seen snakes are the southern and eastern hognose snakes, which prefer sandy woods, fields, and dune areas; and black rat snakes, which grow to 5 feet long, are excellent climbers, and live in high tree cavities. The less common northern water snake is also an excellent tree climber and is seen in the impoundments.

The Fowler's toad is abundant in all habitats on the refuge. Southern leopard frogs and bull frogs inhabit the brackish marshes. Green tree frogs are commonly seen in early spring and autumn (USFWS, 1976).

### **Aquatic Species:**

#### **Mollusks:**

Quahogs, or hard shell clams, live in bayside sand and mudflats. Ribbed mussels cling to banks of low tidal marsh creeks, or guts. Virginia oysters are grown commercially on leased beds below the low tide mark in Toms Cove

and along Assateague Channel. A few "wild oysters" may be found along the low marsh edge and the banks of Toms cove (AINS, 1986).

### **Crustaceans:**

Blue crabs are also abundant in cove and bay waters adjacent to the refuge. In 1967 the refuge began a pumping program to transfer blue crab larvae from Little Toms Cove through a pipe under Beach Road into F Pool. Blue crabs must spawn in highly saline water, but they grow larger and faster in brackish water. Blue crabs maturing in F Pool are food for wading birds, otters, and raccoons. The pumping program was discontinued in 1988; however, crabs still remain in this pool. Crabbing is a popular activity of summer visitors.

Ghost crabs are small omnivores that burrow in the less traveled sections of the refuge beach, eating detritus and dead organisms that wash up in tidal drift. They also prey on eggs and young chicks of beach nesting birds. Their predators include raccoon, fox, gulls, and various shorebirds.

### **Finfish:**

Fish species that inhabit the impoundments are somewhat tolerant of fluctuating water salinity. During droughts and periods of water level drawdown, fish are confined to borrow ditches, where they are an easy food source for wading birds, skimmers, terns, and osprey. Species include the sheepshead minnow, rainwater fish, striped killifish, mummichog, banded killifish, tidewater silverside, threespine and fourspine stickle-back, white and yellow perch, and American eel.

Myriads of fish spawn and feed in the nutrient rich, protected waters on Assateague Island's bay side. Marine finfish of primary recreational or commercial importance in the refuge vicinity include the black drum, red drum or channel bass, bluefish, winter and summer flounder, menhaden, spot, Atlantic croaker, weakfish, mullet, and spotted sea trout.

### **Other:**

Horseshoe crabs are abundant in adjacent ocean waters. In late spring they lay eggs in Toms Cove, providing a crucial food source for long-distance migrant shorebirds that stop to rest and feed on their way to the Arctic. Horseshoe crab availability makes Toms Cove second only to Delaware Bay

as a popular feeding area for ruddy turnstones, red knots, dunlin, semipalmated sandpipers, and sanderlings (Wilds, 1985).

## **Esthetic Quality**

Management of Chincoteague NWR's esthetic resources assumes that (1) unaltered natural areas possess greater scenic potential than modified areas, although some scenic value can be ascribed to the altered landscape if it is in character with the wildlife mission of the refuge; (2) scenic areas that are separated or buffered from unattractive environments are more valuable than those that are not; and (3) while visual resources are important, the policy of habitat protection on the refuge precludes the most visually obtrusive activities.

Overall, Chincoteague NWR is one of the most appealing refuges in the northeast. As a barrier island refuge, Chincoteague's relatively large size, variety of landscape types, accessibility and accommodation to visitor use, seasonal changes, viewing opportunities, and contrast with nearby development combine to make the refuge an outstanding regional esthetic resource.

The refuge as a whole is visually sensitive, and siting is a critical esthetic consideration in any development proposal. The only refuge landscape type that could visually absorb prominent development is the forest, and most of this habitat is ecologically critical and fragile. Design and landscaping thus become crucial components of development schemes which would likely be quite visible to visitors.

Chincoteague NWR affords a good opportunity to coordinate the refuge's visual assets and visual management with surrounding development. Consideration of esthetic interrelationships among commercial, recreational, and protection interests leads to the simple conclusion that many visitors seek out Chincoteague because it is beautiful; these same visitors would likely respond to similar quality in development of commercial, and protection of cultural resources.

The entry to the refuge has a strong image, with views of marsh and open water against a dark pine forested backdrop. The visual appeal of the approach to Assateague Island comes from elements of water and shoreline complexity, vividness, and views of wildlife. The transition from a cultural to



natural landscape is relatively abrupt, although architectural features such as the strong concrete curve of the Assateague Channel Bridge and entry rotary gracefully link the two landscape types. The only truly intrusive note is perceived upon leaving the island, as a fast food restaurant adjacent to the refuge immediately confronts the eye.

The beach and foredune on the northern portion of the refuge consist of a moderately stable dune system and narrow beach front. The beach is accessible to the public only by foot, which heightens the sense of natural integrity and remoteness. Dune fencing is the sole cultural modification in this zone. Qualities of openness, shoreline dynamics, and topographic relief characterize this area.

The recreational beach is the center of summer activity on the refuge. The area consists of an attractive beach, a narrow dune, several acres of parking lots, asphalt, a number of substantial visitor facilities, and bayside marshes. Most development is on the west side of the dunes. The summer character of this beach section is festive, as compared to the relative solitude of other refuge beach areas.

The beach overwash zone south of parking lot 4 is a simple landscape of sand, water, wires, and tire ruts. Shoreline dynamics and views of wildlife on the bayside sand flats are the major assets of the area. The linear pattern of the ruts can be interpreted as either highly intrusive, in terms of natural character, or in keeping with the traditional recreational context of the area.

Toms Cove Hook below the overwash zone shows signs of an extremely dynamic landscape. An accreting expanse of beach and sand flats grades into a subtle configuration of foredunes; the interior portion is a variegated backdune composition of grasses and shrub communities, small pools, and open sand spots. The primary esthetic qualities of this area are its evocation of remoteness (somewhat offset by the over-water views of mainland development and NASA facilities), its openness and exposure, topographic complexity, and subtly diverse array of vegetation communities.

Views over the backdune shrub community in the northern portion of the refuge disclose stands of dense, varied vegetation juxtaposed with open water areas (primarily impounded pools). The ecological integrity of these well-developed backdunes is evident, and qualities of color, vegetation diversity, and scenic backdrops of dark pine forests and water lend this area visual interest.

The relatively large impounded wetlands at Chincoteague NWR are attractive compositions of open water, emergent vegetation stands, and wooded islands against a backdrop of dense shrub communities to the east and woodlands to the west. Certain pools are a focus for wildlife viewing on the refuge. One of their primary qualities is their scale; broad expanses of water area punctuated by pine islands and bounded by wetlands, making a gradual transition from water to land features. The water levels in the impoundments vary, providing seasonal changes in the habitat.

The refuge's natural freshwater wetlands primarily include lowlands west of the impoundments and within the forest communities. Standing water imparts an ethereal, reflective quality to these diverse areas. For the most part, these wetlands are small and inaccessible; their contribution as an esthetic resource is thus peripheral.

Refuge salt marshes are an extension of similar habitat found throughout the region. These areas have high vegetation integrity. They are not, to the eye, diverse communities, but they have strong qualities of shoreline form, texture, and seasonal color variation.

Forested dune communities predominate along the Beach Road and in the west and south portions of the island. In many areas, pure stands of loblolly pines provide an inviting canopy and open, park-like setting. Other mixed species woodlands have dense (in some cases impenetrable) understories.

Wooded areas provide a sense of enclosure and isolation; the forest landscape is one that the visitor can enter and be within, as opposed to the inaccessibility of the marsh and the openness of the beach zones. Visual absorption capabilities are high in stands with a dense understory, and poor in more open stands. Topography also plays a localized role in visual absorption potential. Because many stands are of similar ages, there is a sense of uniformity in refuge forests.

Other developed sites and corridors on the refuge consist of visitor and management facilities, including trails. The visitor contact station complex is hidden in its dune forest setting. The bicycle and Wildlife Loop trails that stem off the site provide major links to areas with a strong wildlife focus, enhancing the image of the area as a refuge.

The refuge offices and adjacent maintenance complex are relatively inobtrusive and easily bypassed by the typical island visitor. Although the old

maintenance area is unsightly, it is screened from the road; however, since auditorium programs are currently incorporated into the complex, a sizable segment of wildlife oriented visitors are exposed to this area as an eyesore.

Trails and associated trail development are particularly well designed. The boardwalks and overlooks are designed and sited to match their forest/marsh edge settings. In general, the variety of landscapes through which the trails pass, the range of trail lengths and types, trail maintenance, and viewing opportunities give refuge trails a high level of esthetic quality.

The lighthouse at the end of Lighthouse Trail is the refuge's strongest cultural visual resource. It is a prominent landmark, and the close-up view obtained on the trail provides an outstanding contrast with the refuge's natural qualities.

The major corridor on the refuge is Beach Road, which passes through a variety of habitats, providing much viewing interest. Other corridors, with the exception of Wildlife Loop, are more primitive and have similar qualities of diversity and wildlife viewing opportunities.

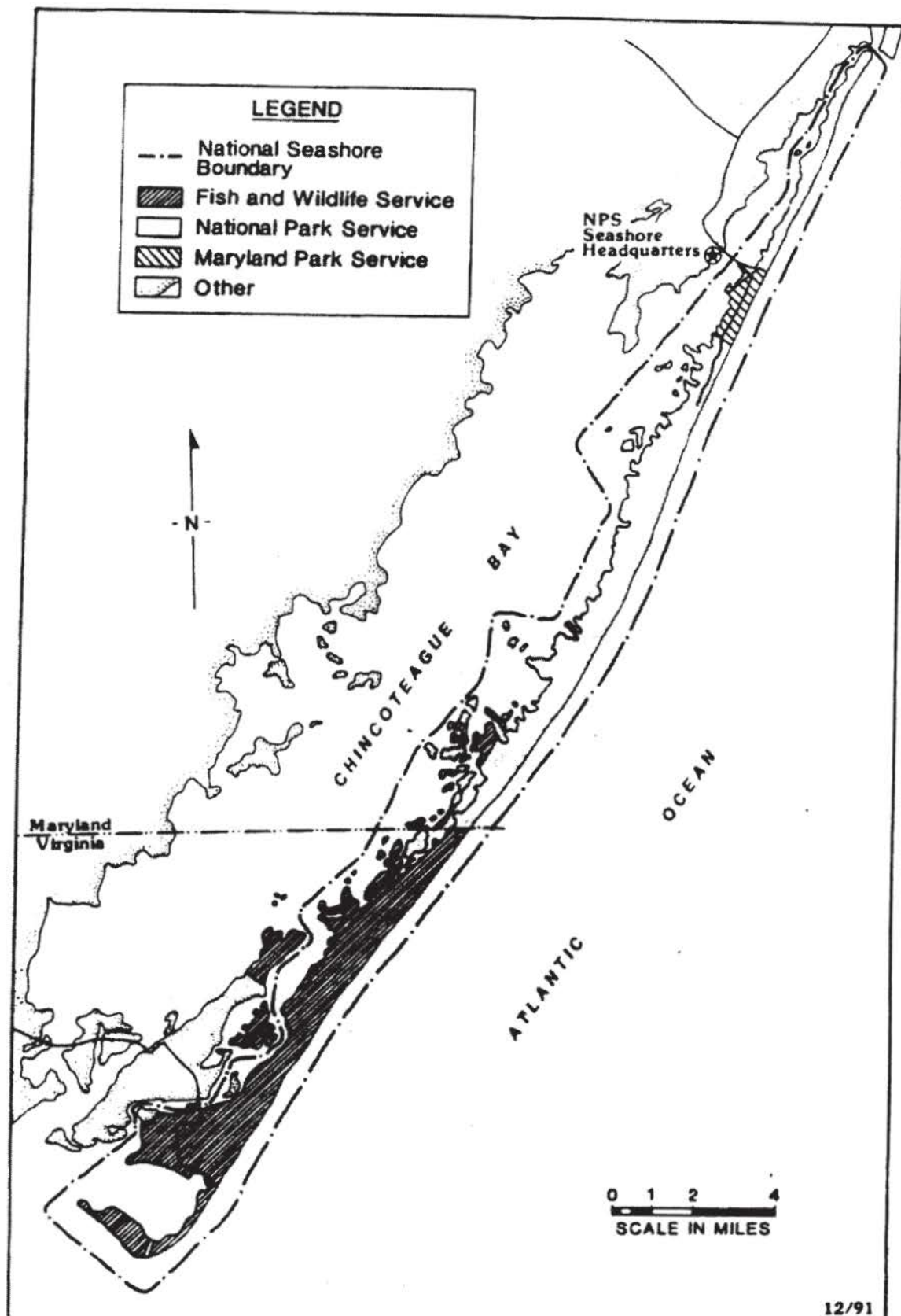
In general, refuge developments are old and outdated with inadequate space for existing visitor service and staff support needs.

## **Recreational Resources**

### **Assateague Island National Seashore:**

Recreational resources on Assateague Island are administered to provide use and enjoyment consistent with maintenance and perpetuation of the island's natural communities. Assateague Island National Seashore encompasses the entire island and adjacent bay areas from the Ocean City Inlet to Fishing Point on Toms Cove Hook. Three public agencies manage specific areas of the island (see Figure 9). In Maryland, Assateague State Park (680 acres) is owned and managed by Maryland's Department of Natural Resources. Except for 418 acres of wetland inholdings owned by the U.S. Fish and Wildlife Service, the National Park Service owns and manages the remaining Maryland portion of Assateague Island. Chincoteague Refuge, the Virginia portion of the seashore, is owned (with the exception of 448 acres of Park Service

Figure 9 .Land Ownership Map



inholdings) and managed by FWS. The National Park Service assists FWS in providing public use programs and recreation management in the refuge's Toms Cove area.

### **Chincoteague NWR:**

Outside of the Tom's Cove area, the refuge provides for a variety of wildlife oriented recreational experience. The refuge visitor contact station, although inadequate to meet the need, records up to 100,000 visits annually. A 3.5 mile wildlife loop which is opened to hiker and bikers and to vehicles after 3:00 PM is heavily used year round to view wildlife. In addition to the Loop, the refuge maintains several miles of trails for either hiking or biking. Major recreational activities include wildlife/wildland, observation and appreciation, photography, education, and the sheer enjoyment of the outdoors. Although conducted for management purposes, the refuge also conducts a white-tailed deer and sika hunt when needed to control the size of the herd. Waterfowl and rail hunting is permitted on some of the remote marsh areas. Surf fishing is also a popular activity.

### **Assateague State Park:**

The State Park beach is divided into swimming, surf fishing, and surf boarding areas. Visitor facilities, including a campground, are open in summer.

### **Assateague Island National Seashore (Maryland):**

The National Park Service manages beach facilities as well as picnic areas and campgrounds at North Beach. Canoe or hike-in campsites are scattered along the bayside. Off-road vehicles are allowed by permit on over 12 miles of designated trails between the Maryland/Virginia state line and the north tip of the island.

The National Park Service offers a broad range of interpretive programs. The Seashore Visitor Center is also the NPS's administrative facility. It is located on the mainland next to the Verrazano Bridge that crosses Sinepuxent Bay to the Park and Seashore entrances.



## Chincoteague NWR - Toms Cove Beach:

The National Park Service assists the Fish and Wildlife Service in interpretation and recreation management on the Toms Cove Hook portion of the refuge. NPS maintains beach parking, picnic, and bathhouse facilities. The NPS visitor center is located in the parking lot vicinity, and serves as their Virginia administrative base from which they conduct interpretive walks and evening programs. NPS provides lifeguards, law enforcement, and first aid care during the summer beach season.

## Visitor Trends

Annual visitation figures, for Chincoteague NWR, have exhibited a sharp rise over the past twenty five years (Figure 10) peaking in 1987 at 1,568,608 with an annual decrease since that time to 1,366,990 in 1990, followed by fluctuating visitation since that time. In 1987 the refuge had the third highest number of visits to any refuge in the country, ranking behind Wichita Mountains Wildlife

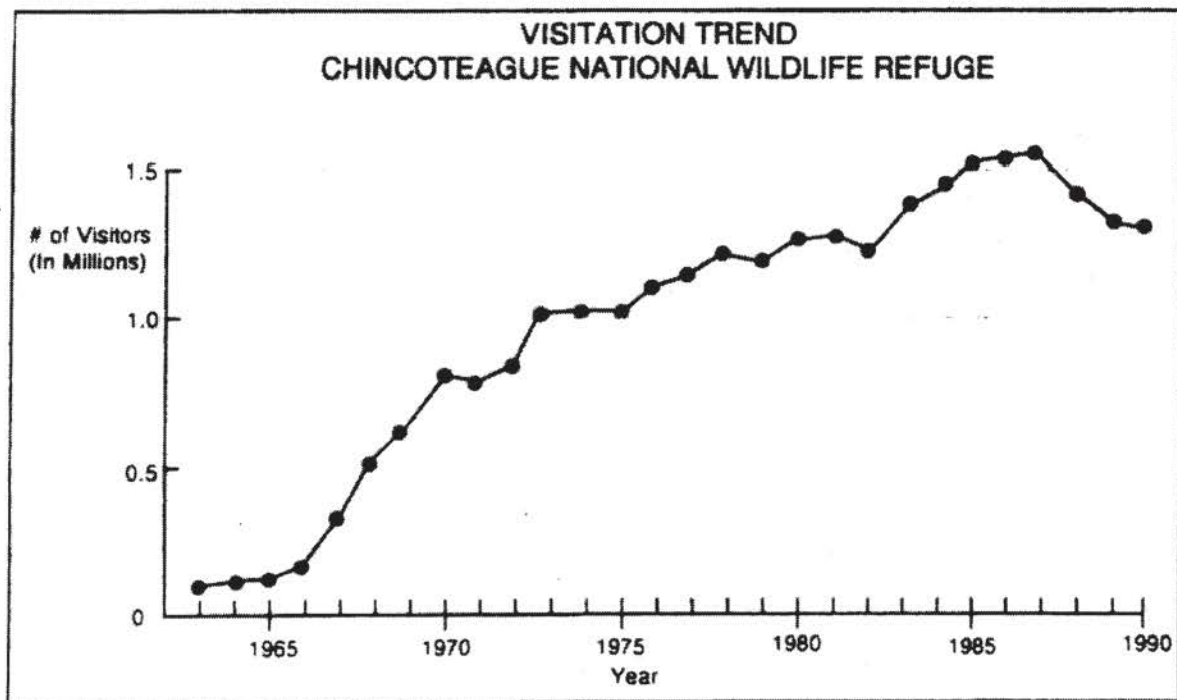


Figure 10. Visitation Trend Graph

Refuge, Oklahoma, and Merritt Island NWR, Florida.

Statistical analysis of visitor figures since 1962, the year the bridge to Assateague Island was built, indicates a gradual slowing of the rate of visitation increase. As visitation has grown, the rate of increase has changed, initially increasing and later decreasing. Analysts in the FWS Division of Policy and Directives Management estimate that, under current management conditions, the rate of visitation increase will settle at about 1% per year over the next 20 years (Aiken, 1987).

From summer 1985 through summer 1986, a visitor survey was conducted at Chincoteague NWR as part of the Public Area Recreational Visitors Survey (PARVS), an interagency effort to collect information on public area visitor characteristics. The survey sample lumped those visitors who entered the Assateague Island National Seashore at the Maryland entrance together with those who visited Chincoteague NWR; analysts assume that the characteristics of the two visitor groups are similar. Over 1400 people were asked to provide information on their recreational activity, demographic background, and expenditures related to their trips to Assateague Island (Aiken, 1987). Visitors to Chincoteague NWR spent significantly more money than visitors to Assateague Island National Seashore. Incomes for individuals visiting the refuge were slightly higher than the incomes of those visiting the seashore. Survey respondents indicated that the convenient location, crowded nature of other areas, and previous use were the major reasons they visited these areas. Seventy-one percent of all Assateague visitors had visited the area previously. Overall, visitors reported a very high satisfaction level for their visit.

In general, refuge visitors include a broad spectrum of people who travel from near and far to appreciate the wildlife and wildlands, or simply to enjoy loafing in a natural setting. PARVS data indicate that visitors stay in the Chincoteague area an average of approximately four days.

More than 50% of the refuge's total annual visitation comes during summer vacation season with present visitation during the fall, winter, and spring being approximately 22%, 7%, and 20%, respectively. Sunny summer weekends draw city and suburb-dwelling professionals from the Washington D.C.-Baltimore area and urban centers on the Delmarva Peninsula to the beach. The traditional pony roundup draws predictably large crowds. Avid birdwatchers from all parts of the world come to observe the richly diverse shorebird species that stop to rest and feed during their late summer southern migration.

Figure 11 illustrates selected wildlife use seasons and seasonal visitor activities.

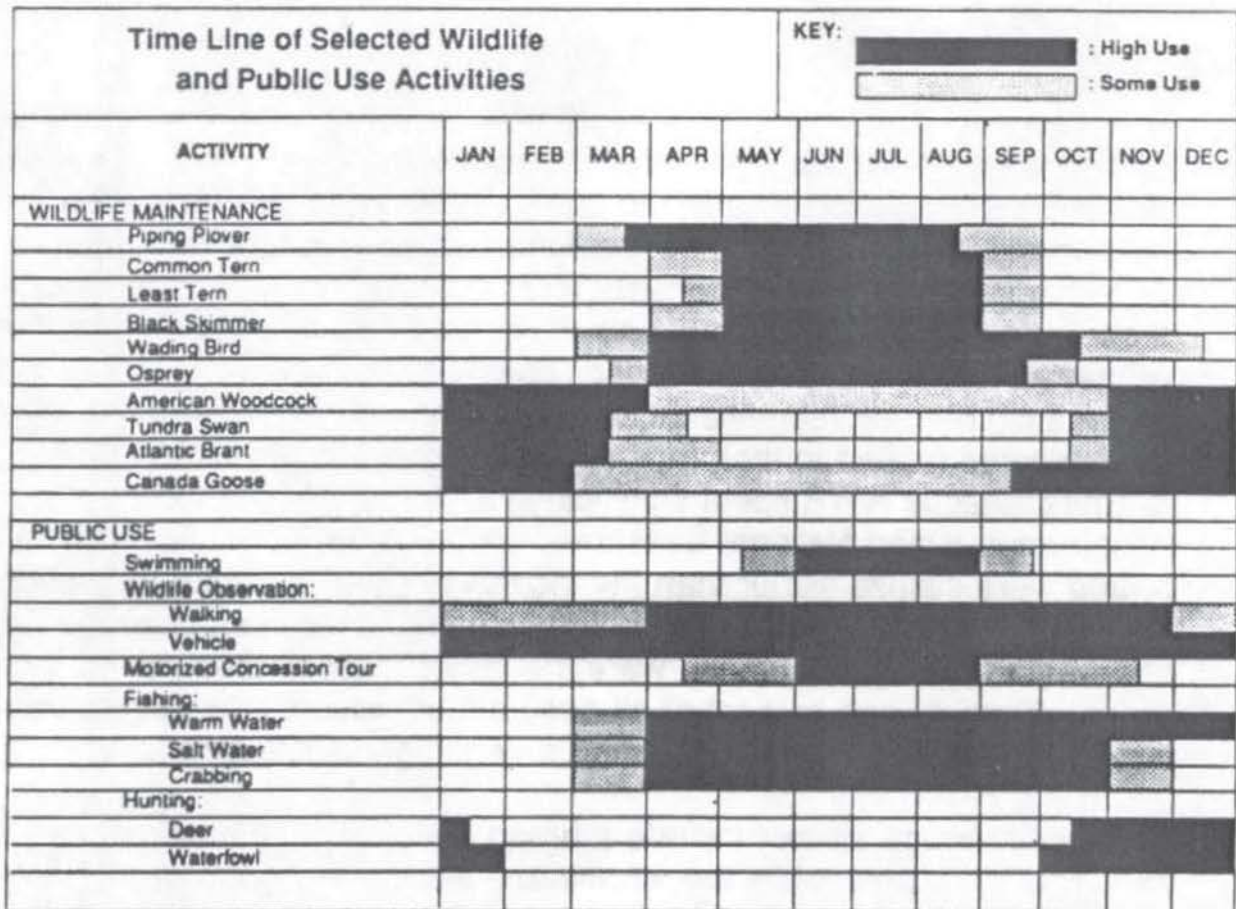


Figure 11. Time Line of Selected Wildlife and Public Use Activities.

Although almost all summer visitors use the beach, surveys indicate people choose Assateague Island beaches because of the wildlife viewing and wildlands experiences offered by the refuge and national seashore (Kornblum et al., 1979 and Aiken, 1987). The PARVS survey suggests that wildlife oriented visitors are likely to travel greater distances to use the refuge than are beachgoers per se.

In autumn, passerine bird and waterfowl migrations draw visitors who enjoy the Wildlife Loop and walking trails with more comfort, as the bug season wanes. Autumn yields some of the year's best saltwater fishing opportunities; however, visitor use declines during the late fall as hunting season gets underway, and remains low during the winter, although this is a fine season to view the thousands of waterfowl that winter on the refuge's impoundment habitat. Visitation picks up again in spring as people come to watch the spring migrations, nesting, and foaling, and as the fishing improves.





# PLANNING GUIDANCE

## Overview of the Planning Process

Refuge master planning is a comprehensive system of resource planning that provides long-range management guidance for a wildlife refuge. It is an opportunity to study present and future demands on the refuge and analyze the refuge's capability to meet those demands. Master planning requires taking a step back from the day-to-day business of running a refuge to consider resolution of issues in a context that recognizes the complex interactions of refuge activities.

During master plan development, a series of alternative plans were developed and their consequences assessed. These plans were presented to the public as both a Draft and Final Environmental Impact Statement. These master plan alternatives were devised after consideration of information and direction from many sources. The final planning product is this Master Plan, which establishes major refuge objectives and defines general strategies for achieving these objectives.

The remainder of this section describes factors considered during the master plan development:

- Service Policy
- Wildlife Trends
- Laws and Regulations
- Public Involvement
- Previous Plans
- Management Issues
- Refuge Outputs
- Funding

## Sources of Direction

### Fish & Wildlife Service Mission and Goals:

Chincoteague Refuge is in the Northeast Region of the U.S. Fish and Wildlife Service, (USFWS) Department of the Interior and is one unit of the National Wildlife Refuge System (see Figure 12). The primary direction for refuge management is thus the policies provided by the FWS for the National Wildlife Refuge System (NWRS).

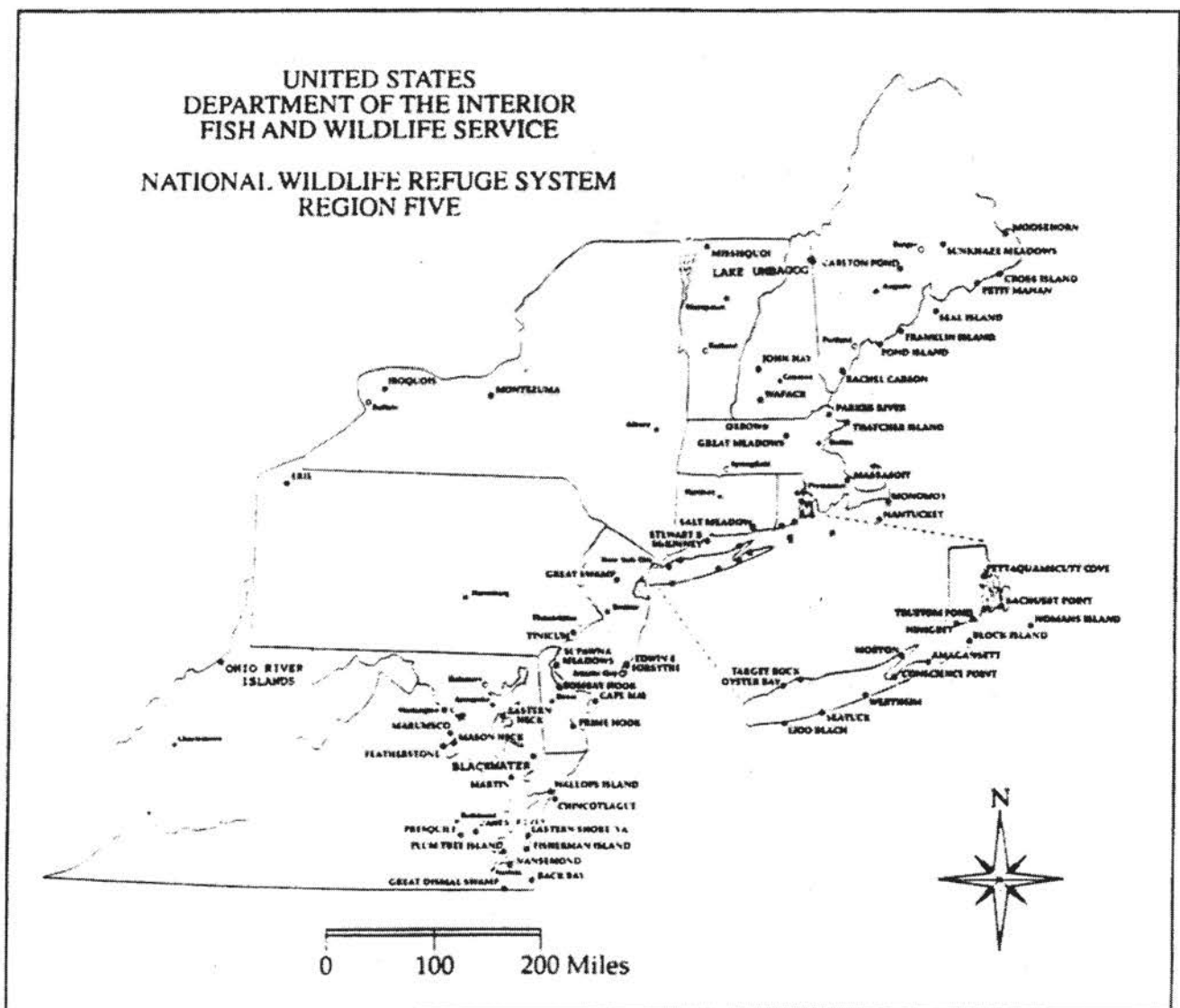


Figure 12 Region 5 Map

The mission of the NWRS is to provide, preserve, restore, and manage a national network of lands and waters sufficient in size, diversity, and location to meet society's needs for areas where the widest possible spectrum of benefits associated with wildlife and wildlands is enhanced and made available. (USFWS, 1982)

To achieve this mission, each refuge emphasizes specific contributions it can make that are consistent with the following long-range System objectives:

1. To preserve, restore, and enhance in their natural ecosystem (when practicable) all species of animals and plants that are endangered or threatened with becoming endangered
2. To perpetuate the migratory bird resource
3. To preserve a natural diversity and abundance of fauna and flora on refuge lands
4. To provide an understanding and appreciation of fish and wildlife ecology and people's role in their environment, and to provide refuge visitors with high quality, safe, wholesome, and enjoyable recreational experiences oriented toward wildlife, to the extent these activities are compatible with the purposes for which the refuge was established

The Assistant Regional Director for Refuges and Wildlife has established ten goals for FY1993 that further clarify the direction for refuges in the Service's Northeast Region, as follows:

1. An up-to-date information base on refuge biological and physical resources
2. Maximum use of FWS lands to restore threatened and endangered species
3. Habitat and population management that perpetuates the migratory bird resource and biodiversity
4. An informed public that values fish and wildlife resources, understands events and issues related to these resources, and acts to promote fish and wildlife conservation

5. Acquisition and protection of additional habitat to perpetuate the fish and wildlife resource
6. Compliance with laws and regulations designed to control or eliminate effects of contaminants on refuges
7. Efficient administration of functions that support Refuges and Wildlife objective accomplishment
8. A motivated well-trained work force that represents the nation's cultural diversity
9. Effective fire management on service and cooperative lands
10. Compliance with historic and archaeological resource protection laws and regulations

### **Laws and Regulations Affecting All National Wildlife Refuges:**

Refuge management must comply with federal environmental laws, executive orders, and regulations affecting land and water use as well as the conservation and management of fish and wildlife resources. The principal federal statutes affecting refuge planning and management are summarized in Table 2. Regulations developed to guide implementation of applicable laws are codified under Title 50 of the U.S. Code of Federal Regulations (50 CFR).

Chincoteague is administered as a migratory bird refuge under the authorities of the Migratory Bird Treaty Act of 1918, the Migratory Bird Conservation Act of 1929, and the Migratory Bird Hunting and Conservation Stamp Act of 1934. These acts provide for federal protection of all migratory birds and acquisition of land and water for conservation of the migratory bird resource.

Refuge management is guided by the National Wildlife Refuge System Administration Act of 1966. The act directs the Fish and Wildlife Service to administer refuges for the conservation of fish and wildlife. Recreational uses of a refuge are authorized by the act if FWS determines that such uses are compatible with the major purposes for which such areas were established.

In 1976, Congress amended the National Wildlife Refuge System Administrative Act (PL 94-223) to state that primary responsibility for the administration of lands or waters included within the National Wildlife Refuge

**TABLE 2. LAWS and EXECUTIVE ORDERS AFFECTING MANAGEMENT of CHINCOTEAGUE NWR**

Directive	Explanation
Rivers and Harbors Act of 1899, Section 10	Prohibits altering navigable waters without appropriate federal approval.
Antiquities Act of 1906	Requires a permit for archaeological site examination on certain federal lands.
Refuge Trespass Act of 1909, as amended	Makes it unlawful (except in compliance with rules and regulations) to hunt, trap, capture, willfully disturb, or kill any bird or other wild animal on a refuge.
Migratory Bird Treaty Act of 1918, as amended by PL 94-215 in 1976	Controls taking, possessing, selling, transporting, and importing migratory birds.
Migratory Bird Conservation Act of 1929 as amended	Pertains to acquisition, development, and, maintenance of migratory bird refuges.
Fish and Wildlife Conservation Act of 1934 as amended	Establishes measures for protecting wildlife resources in connection with water use projects.
Migratory Bird Hunting and Conservation Stamp Act of 1934, as amended	Requires waterfowl hunters to possess a duck stamp; authorizes acquisition of lands for waterfowl production areas; and prescribes the use of duck stamp revenues to acquire migratory bird refuge areas under provisions of the Migratory Bird Conservation Act.
Historic Sites, Buildings and Antiquities Act of 1935, as amended	Declares a national policy to preserve historic sites and objects of national significance, including those located on refuges, for public use.
Fish and Wildlife Act of 1956, as amended	Provides national policy for development, management, protection, and conservation of fish and wildlife resources, including refuge land acquisition and facilities development.
Refuge Recreation Act of 1962, as amended	Authorizes use of refuges and acquisition of adjacent lands for recreation when such use does not interfere with the primary purpose of the refuge.
Refuge Revenue Sharing Act of 1964	Pertains to payment of certain net revenues from refuges to local counties for use in public schools and roads.
Wilderness Act of 1964	Directs the Secretary of the Interior to review and recommend areas that may qualify for formal preservation under a special act of Congress.



(Table 2 cont.)

**Directive**

Land and Water Conservation Act of 1965 as amended

National Wildlife Refuge System Administration Act of 1966

National Historic Preservation Act of 1966, as amended

National Environmental Policy Act of 1969, as amended

Environmental Education Act of 1970

Executive Order 11643, 1972, "Animal Damage Control"

Executive Order 11644, 1972, "Use of ORVs on Public Lands"

Coastal Zone Management Act 1972

Marine Protection Research and Sanctuaries Act of 1972, as amended

Endangered Species Act of 1973, as amended

Executive Order 11752, 1973, "Pollution Abatement and Prevention"

**Explanation**

Pertains to appropriations for acquisition of lands for recreation as well as preservation of endangered or threatened fish and wildlife.

Provides guidelines for the administration of all units of the National Wildlife Refuge System.

Provides for the protection, rehabilitation, restoration and reconstruction of historic and archaeological resources. Directs federal agencies to inventory historic, archaeological and paleontological properties for inclusion on the National Register of Historic Places and to adopt policies that contribute to the protection of such resources on non-federal lands.

Requires federal agencies to analyze impacts prior to taking major actions that may significantly affect the quality of the human environment.

Pertains to the use of federal services and facilities for the development and maintenance of educational programs.

Provides environmental safeguards for animal damage control activities on federal lands and generally prohibits chemical toxin use to kill predators on federal lands or in federal programs.

Directs federal agencies to develop and issue regulations for the control of ORVs on lands under their custody and control.

Establishes federal policies and goals for management and development of the nation's coastal zone and provides a program to encourage coastal states to develop management plans in conformity with federal standards.

Authorizes the Secretary of Commerce, with Presidential approval, to designate ocean waters as national marine sanctuaries for the purpose of preserving and restoring their conservation, recreation, ecological or aesthetic values.

Pertains to the conservation of threatened and endangered species of fish, wildlife, and plants by federal action.

Requires federal agencies to comply with PL 92-500 (Federal Water Pollution Control Act amendments) and gives the details for compliance.

(Table 2 cont.)

Directive	Explanation
Archaeological and Historic Preservation Act of 1974	Provides for the preservation of all historical and archaeological data that would be lost or destroyed by any federally funded or licensed project or program.
Federal Land Policy and Management Act of 1976	Establishes procedures for creating, modifying and terminating withdrawals and reservations of public lands.
Federal Water Pollution Control Act of 1972, as amended by the Clean Water Act of 1977	Establishes a federal permit system for certain pollution discharge activities in United States waters.
Section 208 (Water Quality Management)	Pertains to water pollution control and abatement requirements; places responsibility for resolving problems with state and local governments.
Section 402	Requires Environmental Protection Agency permits to discharge any pollutant into navigable waters.
Section 404	Regulates the discharge of dredged or fill material into United States waters; acts as the main federal vehicle for wetlands protection.
Executive Order 11987, 1977, "Exotic Organisms"	Restricts executive agencies from introducing exotic species into any natural ecosystem in the United States.
Executive Order 11988, 1977, "Flood Plain Management"	Directs federal agencies to minimize flood impacts and to protect the natural and beneficial values of flood plains.
Executive Order 11990, 1977, "Protection of Wetlands"	Directs federal agencies to minimize wetland loss or degradation, and to preserve and enhance the values of wetlands.
Archaeological Resources Protection Act of 1979	Supplements the 1906 Act's archaeological research permit procedures, and establishes legal penalties for inflicting damage to irreplaceable archaeological resources on public lands.
Coastal Barrier Resource Act of 1982 as amended	Provides protection to coastal barrier along the Atlantic and Gulf coasts by restricting federal expenditures and financial assistance which have the effect of encouraging development of coastal barriers and by considering the means by which the long-term conservation of these fish, wildlife, and other natural resources may be achieved.
Executive Order 12372, 1982	Provides for a formal vehicle for early evaluation, review and coordination of federal or federally assisted activities with state and local governments.

System shall rest with the Fish and Wildlife Service. This clarifies the role of the Fish and Wildlife Service at Chincoteague NWR. Although most of the refuge lies within the boundary of Assateague Island National Seashore, which is administered as a whole by the National Park Service, the Fish and Wildlife Service retains primary responsibility for all administration and management of refuge lands.

The Endangered Species Act of 1973 instructs federal agencies to carry out programs to conserve endangered and threatened species and to conserve the ecosystems on which these species depend. This act has noted relevance for Chincoteague NWR:

- Endangered peregrine falcons nest on the refuge, and hundreds of falcons stop there to feed and rest during migration.
- The recovery plan for the endangered Delmarva Peninsula fox squirrel assigns specific responsibility for implementation of many recovery actions to Chincoteague NWR.
- The Atlantic population of piping plovers is a federally designated threatened species. Chincoteague NWR supports more nesting pairs of these birds than any other national wildlife refuge.

### **Chincoteague NWR Establishment Authorization:**

Refuge establishment was initiated on May 13, 1943 through acquisition of 8,808 acres under authority of the Migratory Bird Conservation Act. The Assistant Secretary of the Interior determined that FWS ownership of this land was necessary for protection during nesting and migration seasons of all those species of wildlife determined as being of great value as a source of food, or in destroying of injurious insects, or nevertheless in danger of extermination through lack of adequate protection (U.S. District Court, 1943). The Migratory Bird Conservation Commission (MBCC) initially approved the refuge at a meeting on March 25, 1941, acknowledging the importance of Assateague Island as prime wintering and migrating habitat for the greater snow goose (then considered endangered) and other waterfowl (MBCC, 1941). At that time they also approved acquisition of Jerico and Hebron Islands, two small marshes adjacent to Assateague Island, just north of the Virginia-Maryland boundary (see Figure 13).

All Chincoteague Refuge lands have been purchased with money from either the Migratory Bird Conservation Fund or the Land and Water Conservation Fund. Federal title of these lands is acquired to the mean low water line.

Recreational use and related development on Assateague Island were originally authorized by Congress under Public Law 85-57 approved on June 17, 1957, that provided for construction of a bridge and road to the refuge as well as for recreational facilities in the southeastern shore of the island. These rights for development were subject to "such terms and conditions as the Secretary of the Interior deems appropriate for the adequate protection of the wildlife refuge." Under special agreement with the FWS, the Chincoteague-Assateague Bridge and Beach Authority (a political subdivision of the State of Virginia) developed and managed beach front recreational facilities and provided visitor services.

### **Assateague Island National Seashore Establishment Authorization:**

On September 21, 1965, President Lyndon B. Johnson approved the Assateague Island Seashore Act authorizing establishment of Assateague Island National Seashore. It directs federal protection and development of Assateague Island in the State of Maryland and Virginia as well as certain adjacent waters and small marsh islands for wildlife refuge and public outdoor recreation purposes. This Act provides that the Seashore shall be administered by the NPS for general purposes of public outdoor recreation with the qualification that land and water within the refuge be administered for purposes under laws and regulations applicable to national wildlife refuges, including administration for public recreation use in accordance with the provisions of the Refuge Recreation Act. The Assateague Island Seashore Act also authorized the Secretary of the Interior to acquire all of the rights, title, and property of the Chincoteague-Assateague Bridge and Beach Authority. This acquisition was completed by the NPS in 1966.

Several development projects, including overnight accommodations and a highway running the length of the island, were also authorized in the Act; however, controversy surrounding environmental, administrative, and fiscal aspects of these plans led to eventual amendment of the Act in 1976 (PL 94-578), deleting requirements for all such development.

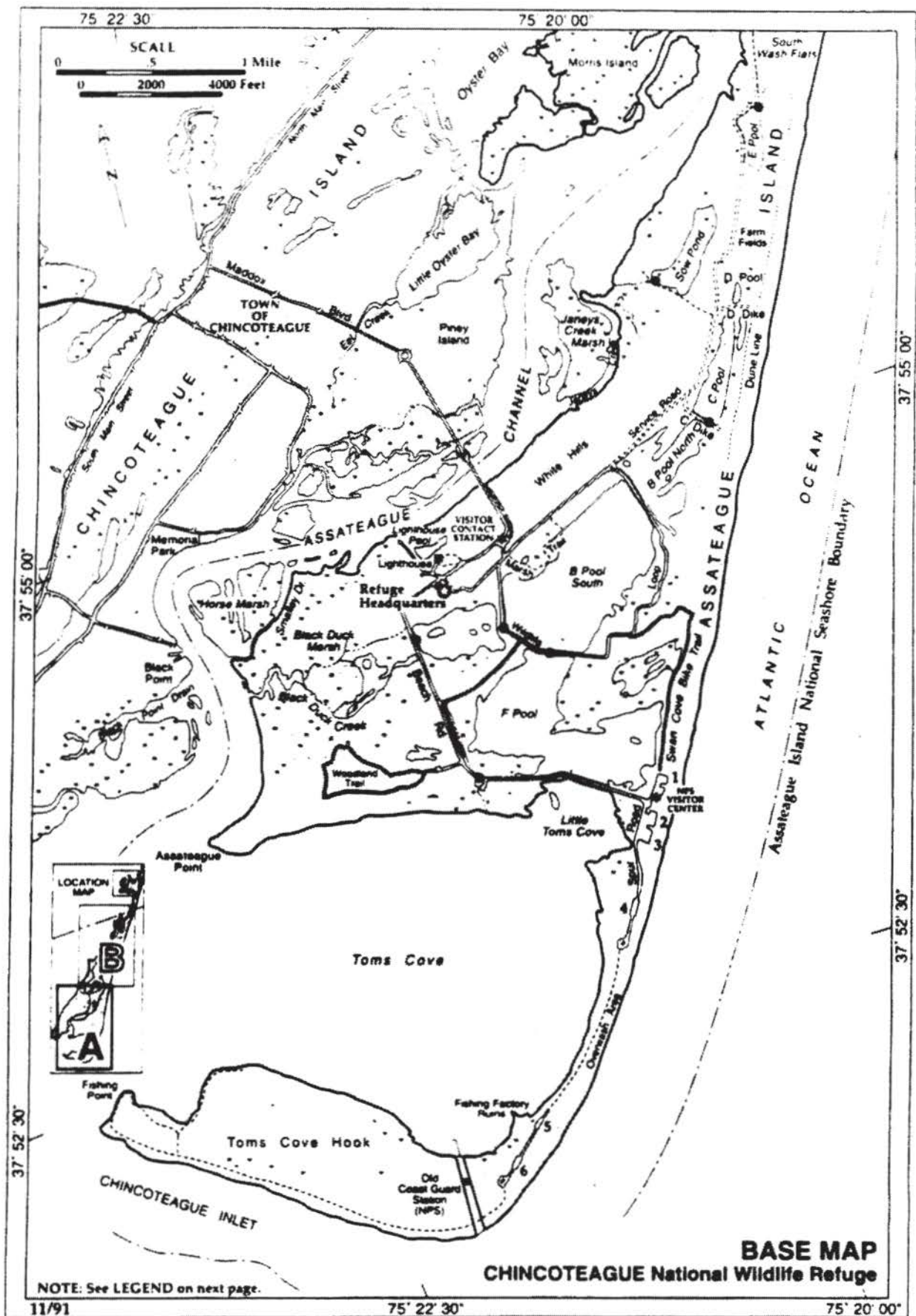


Figure 13 Base Map A



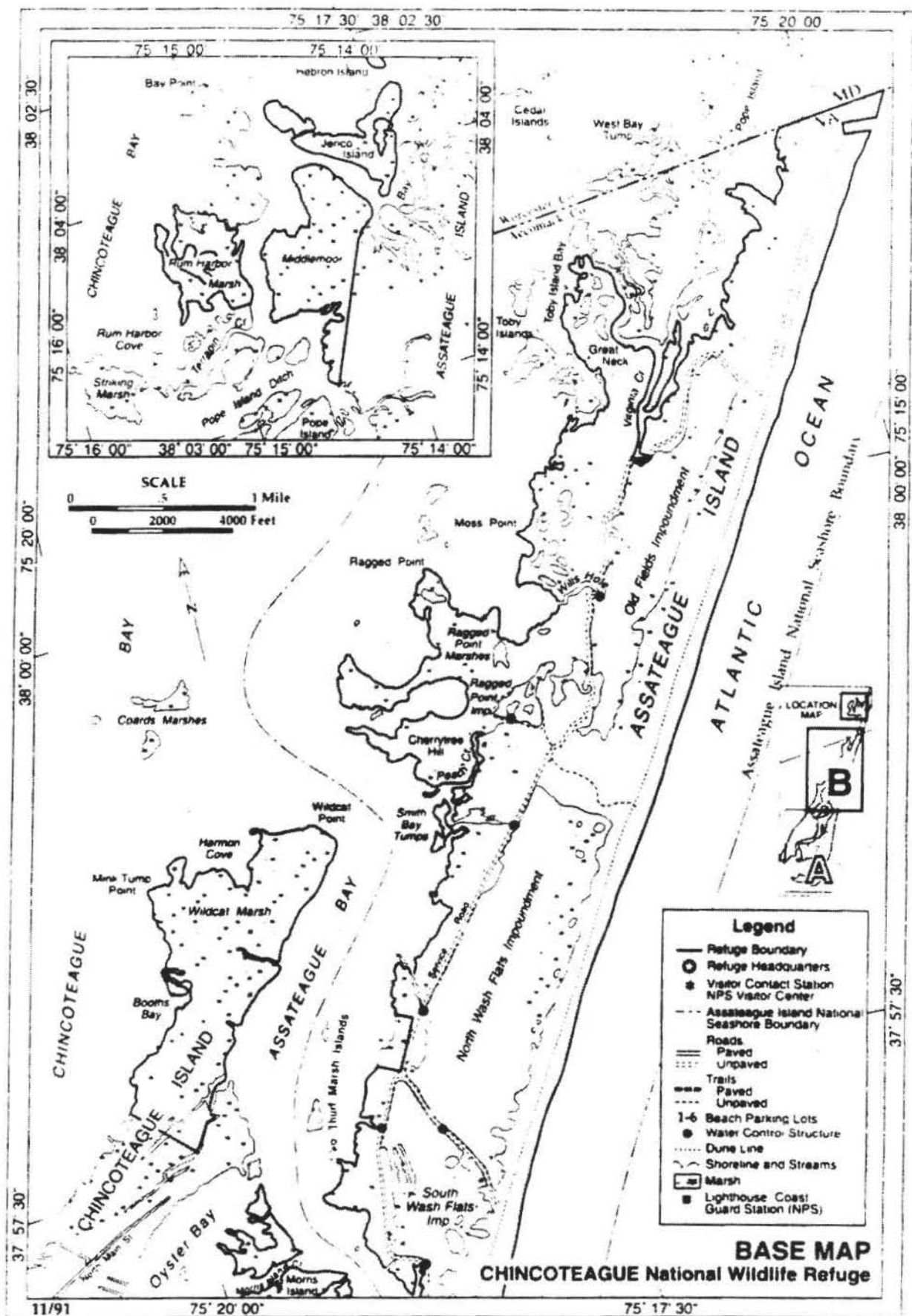


Figure 13 Cont'd Base Map B

In 1977, the National Park Service began a cooperative planning effort with the Fish and Wildlife Service and the Maryland Park Service. The resulting 1982 Assateague Island National Seashore General Management Plan describes management proposals for those portions of the seashore that NPS manages.

Since the 1966 acquisition of the Chincoteague-Assateague bridge and other rights, NPS has managed public use at the Toms Cove Hook beach as an agent of the Fish and Wildlife Service, which owns the beach as part of Chincoteague NWR. A 1990 Interagency Agreement between FWS and NPS clarifies the NPS role on this portion of the Seashore.

Today NPS continues to manage public use within an "assigned area" defined in the interagency agreement. FWS has primary responsibility for managing the wildlife resources within this area, allowing beach and other recreational use in compliance with the Refuge Recreation Act of September 28, 1962 (Public Law 87-714), which reads in part:

"...to assure that any present or future recreational use will be compatible with, and will not prevent accomplishment of the primary purposes for which the said conservation areas were acquired or established, the Secretary of the Interior is authorized, as an appropriate incidental use, to administer such areas or parts thereof for public recreation when in his judgment public recreation can be an appropriate incidental or secondary use: provided, that such public recreation use shall be permitted only to the extent that is practicable and not inconsistent with other previous authorized federal operations or with the primary objectives for which each particular area is established..."

## **State Regulations:**

The Fish and Wildlife Service cooperates with the State of Virginia in regards to state statutes and regulations such as:

- Virginia Coastal Resources Management Program (CRMP)

Any and all federal activities must be reviewed and a determination of consistency made regarding Virginia's federally approved coastal resources management program policies. The CRMP states that

priority use of coastal dune systems and barrier islands is preservation and conservation. FWS and NPS activities and development projects in or directly affecting these resources and/or the coastal zone must be consistent to the maximum extent practical with a federally approved State Management Program.

- State Historic Preservation Act

This act provides protection complementary to the Federal Historic Preservation Act. The State Historic Preservation Office maintains a list of cultural resources sites that are proposed and formally listed in the State Register of Historic Places.

- Virginia Endangered Species and Nongame Program

The Service cooperates with the State Department of Game and Inland Fisheries in management of bald eagles, American peregrine falcons, Delmarva Peninsula fox squirrels, and piping plovers on and near the refuge.

## **Previous Plans:**

Numerous studies, proposals, and plans address natural and public use resources on Assateague Island. The following documents have particular bearing on this master plan:

- 1974 Assateague Island Wilderness Study Summary was prepared in response to the Wilderness Act of 1964 to determine the potential inclusion of CNWR and AINS in the National Wilderness Preservation System. The study indicates that approximately 8,000 acres or about 45% of federally owned lands on Assateague Island qualify for wilderness designation, of which 1,300 acres are located on CNWR. A Wilderness Area proposal was submitted to Congress on January 13, 1977.
- 1982 Assateague Island General Management Plan describes development and public use management plans for the NPS-managed portion of the island. The proposal for refuge lands was selected in cooperation with the FWS.

- 1983 Fire Management Plan and Environmental Assessment describes the refuge's wildfire control and prescribed burning programs. Alternatives to the use of fire as a management technique are discussed.
- 1983 Environmental Assessment for the Control of the Southern Pine Beetle Infestation and accompanying Biological Evaluation at Chincoteague Refuge summarizes the 1983 status and trend of southern pine beetle populations at the refuge and reviews current suppression procedures and preventative measures.
- 1985 Regional Resource Plan, Region 5 directs implementation of management strategies to protect and support production of species of national and regional significance at Chincoteague NWR. Regional Resource Plans link national policy to on-the-ground Service activities in specific geographic areas. They describe how the Service will protect special emphasis species or species groups.
- 1985 Feral Pony Management Plan Assateague Island National Seashore is directed at management of the NPS-owned Maryland pony herd. An overview of ecological impacts, disease and injuries, and interactions with humans is given along with recommendations for mitigation. Under current actions, the NPS transfers selected ponies to the Chincoteague Volunteer Fire Company's herd on the refuge when the NPS population size approaches a defined limit.
- 1986 Analysis of Traffic Management Options offer six options for managing high density traffic travelling through the refuge to the ocean beach are identified and evaluated. This report was funded by the Committee to Preserve Assateague Island, Inc. See report summary, Appendix F.
- 1988 Environmental Assessment for the Management of Piping Plovers on Toms Cove Hook establishes the closure of 2.5 miles of Toms Cove Hook during the piping plover nesting season.
- 1990 Atlantic Coast Piping Plover Recovery Plan presents the objectives and recovery strategies for piping plover on the Atlantic Coast.

- 1990 Pony Management Plan outlines refuge and Fire Company responsibilities in managing the ponies and establishes a vegetative monitoring program to assess pony impacts.
- 1992 Hunting Management Plan and 1993-94 Annual Hunting Program plans provide guidance for the regulation of the public deer hunting programs.
- 1992 Upland Management Plan addresses upland management with emphasis on the endangered fox squirrel and habitat diversity.
- 1992 Marsh and Water Management Plan and 1993 Water Management Program address water level manipulation in the refuge's impoundments, describes each pool's wildlife and vegetation characteristic, and provides a timetable of waterfowl and other bird migration.
- 1993 Wildlife Inventory Plan describes the refuge's inventory procedures for various species of wildlife.
- 1993 Delmarva Peninsula Fox Squirrel Recovery Plan outlines procedures designed to maintain the existing fox squirrel populations and to restore the species to its former known range.
- 1993 Public Use Plan describes current public use programs and future needs along with impacts to other programs.
- 1993 Predator Control Plan and 1993 Predator Control Program refers specifically to the control of mammalian, avian and crustacean predators on waterfowl and shorebirds.

## **Public Involvement and Planning Issues**

During internal reviews, scoping, and resource analysis, and as a result of a field station evaluation, several long-term issues requiring planning analysis emerged. Also between March 1990 and February 1991 scoping meetings were held with local, county, and federal agencies and with private groups to exchange information and identify issues. The Draft Environmental Impact Statement was available for comment between January and May, 1992, and



the Final Environmental Impact Statement was available for comment between August and October 1992. The Notice of Record of Decision and Statement of Findings document accepting the proposed action alternative was published in the Federal Register on December 10, 1992. These issues, as follows, are addressed in this Master Plan:

- Issue 1 - Important wildlife habitat in the refuge area will not be adequately protected from the impact of development unless acquired or otherwise protected by the refuge.
- Issue 2 - Protection of endangered and threatened species necessitates seasonal closing of vital nesting and feeding habitat to public uses.
- Issue 3 - Dependency on rain as the only freshwater supply curtails flexibility to manage refuge impoundments for consistent and desirable wildlife uses.
- Issue 4 - Neither the long-term effectiveness nor legality of artificial dune manipulation to protect public use and wildlife management facilities are clearly understood.
- Issue 5 - High numbers of sika and/or white-tailed deer impact forest, marsh, and impoundment vegetation.
- Issue 6 - Predation from populations of red fox and raccoons cause a loss of ground-nesting birds, including the threatened piping plover and other species of concern.
- Issue 7 - During high visitation periods the carrying capacities of existing parking facilities and the road system are exceeded.
- Issue 8 - Off-road vehicle use on the beach prevents the natural movement of the island by impeding dune and vegetation development.
- Issue 9 - When not confined, the Chincoteague ponies consume waterfowl food, disturb ground nesting birds, conflict with automobile traffic, and may injure visitors who approach them.
- Issue 10- Existing refuge administration buildings were constructed during an era of fewer management programs and much lower public use and are

now inadequate to meet present and future needs for office space and to effectively serve the public.

Issue 11- Proper siting of a new headquarters/visitor center, where it will most effectively meet the present and future needs of the refuge staff and the public, is needed.



# **LONG-RANGE MANAGEMENT OBJECTIVES**

Long-range objectives were developed for Chincoteague NWR after reviewing the management guidance, issues, and range of possible outputs discussed in the previous section. The objectives are stated as non-quantified management priorities. Collectively, they link the broad National Wildlife Refuge System mission and goals with Chincoteague NWR's specific management strategies.

## **Habitat Protection:**

- Ensure the integrity of the refuge ecosystem and regionally significant ecosystems by providing federal protection to valuable wetlands, areas of high species diversity, critical, declining or valuable habitats, and corridors to link protected habitats.
- Consolidate Fish and Wildlife Service holdings within the approved refuge boundary.
- Post and protect lands and waters within the refuge boundary. Monitor land use threats to refuge resources and ensure effective, timely coordination of protection efforts.
- Minimize or mitigate adverse impacts to the refuge environment from management and development activities.

## **Natural Resource Management**

- Protect and manage particular habitats for fish and wildlife species or groups of species as identified in Endangered Species Recovery Plans, FWS Regional Resource Plans, or which are otherwise of regional or national significance.
- Ensure the continued viability of all refuge habitats, with emphasis on enhancing forest and fresh and brackish water impoundment communities, maintaining high quality natural beach/dune habitat, and controlling disease/insect/wildfire outbreaks.

- Protect and manage fish and wildlife populations on the refuge with emphasis on enhancing species of national and regional significance, protecting nesting and migrating populations, and maintaining wildlife populations within the refuge's carrying capacity.
- Build a valid management understanding of the barrier island/marsh ecosystem through ecological monitoring and appropriate research.

## **Archaeological and Historical Resource Management**

- Preserve and protect, and interpret as appropriate, resources of archaeological and/or historical significance on the refuge.

## **Public Use Management**

- Ensure that public use activities and facilities are compatible with refuge purposes and consistent with refuge objectives.
- Focus interpretive and educational messages on station objectives and related management strategies.
- Convey to the maximum number of refuge visitors highlights of the refuge's contribution to fish and wildlife conservation, and its role in the National Wildlife Refuge System.
- Convey to the maximum number of refuge visitors the fact that Service lands are managed primarily for fish and wildlife; therefore, public use may be restricted.
- Assess the need for and, where necessary, develop and adhere to visitor carrying capacities.
- Ensure that visitor sites and facilities are necessary, function efficiently, and are safe, welcoming, and visually attractive.
- Allow non-wildlife activities (primarily beach recreation) within the area assigned to NPS for management of public use activities as long as these activities are compatible with the purposes for which the refuge was established. Assure that activities such as swimming



and sunbathing do not, over time, pre-empt experiences that are in keeping with the overall wildlands character of the area.

## **Cross-Program Management**

- Ensure public safety, prevent degradation of refuge resources, and protect facilities by controlling wildfires and other hazards, complying with Fish and Wildlife Service standards during implementation of management actions, and enforcing laws and regulations.
- Enlist the volunteer service of individuals and organized groups to enable more effective management of both natural resource and public use activities.

## **Refuge Development and Maintenance**

- Ensure appropriate facilities and development to support all refuge management programs. Minimize impacts to the environment during both construction and operation of development projects, pursue cost effective designs that are visually compatible with the site, and develop handicapped accessible facilities and site designs.
- Protect habitat and public use facilities as warranted by stabilizing the dune system in compliance with federal and state coastal resources regulations.

## **Refuge Administration and Coordination**

- Ensure adequate staffing to achieve resource and public use management objectives. Allocate annual staff efforts and funds according to refuge management priorities.
- Coordinate with appropriate agencies, organizations, and individuals to protect the refuge and surrounding environment, aid in public use activities, and maintain refuge facilities. In particular, effectively utilize the assistance and expertise of the National Park Service and work with the Chincoteague Volunteer Fire Company in areas of mutual concern.

- Support studies by other agencies and organizations, uniting the studies into an integrated research effort directed toward areas of critical management information needs.
- Support on-refuge educational and interpretive activities of other agencies and organizations where compatible with refuge public use programs. In particular, support barrier island-oriented recreational, interpretive, and other National Park Service programs, which conform with Article II, Section A.1 of the Interagency Agreement between the U. S. Fish and Wildlife Service and the National Park Service.

## Quantitative Objectives

Chincoteague NWR demonstrates its contribution to the broad mission of the Fish and Wildlife Service and goals of the National Wildlife Refuge System through a set of outputs. Outputs are specific wildlife or public use benefits derived from the protection and management of the wildlife refuge.

To clarify and substantiate the refuge's broad planning goals, more specific quantitative and qualitative objectives for each refuge output are identified. These objectives provide major guidance for management of Chincoteague Refuge. The objective for each output is based on:

1. The refuge's capabilities and priorities as a unit of the National Wildlife Refuge System. High priority outputs do not preempt other desired uses if conflicts can be resolved.
2. Issues identified by the Service and the public, and critical resource issues.
3. Long-range trends and demand projections for wildlife and public uses.

Table 3 summarizes current production rates and long range quantitative objectives for Chincoteague Refuge. Objective Documentation Records detailing the decision-making rational for each output objective are found in refuge files.

**TABLE 3 REFUGE OUTPUTS AND OBJECTIVES**

<b>OUTPUT: WILDLIFE</b>	<b>CURRENT OUTPUT</b>	<b>OBJECTIVE LEVEL</b>
Peregrine Falcon Pro. (Young)	2-4	2-4
Peregrine Falcon Maint. (UD)	9,000	9,000
DP Fox Squirrel Maint. (UD)	109,500	146,000
So. Bald Eagle Maint. (UD)	100	200
Piping Plover Prod. (Young)	60	110
Piping Plover Maint. (UD)	3,600	5,880
Canada Goose Prod. (Young)	170	< 170
Canada Goose Maint. (UD)	84,600	159,000
Greater Snow Goose Maint. (UD)	122,000	250,000
Tundra Swan Maint. (UD)	21,800	27,000
Atlantic Brant Maint. (UD)	175,000	200,000
Dabbling Duck Maint. (UD)	344,000	550,000
Diving Duck Maint. (UD)	30,500	35,000
Mute Swan Prod. (Young)	21	0
Mute Swan Maint. (UD)	6,900	0
Osprey Maint. (UD)	1,035	2,500
Wading Birds Maint. (UD)	124,000	186,000
Shorebird Maint. (UD)	1,900,000	3,000,000
Tern Maint. (UD)	31,300	45,200
White-tailed Deer Maint. (UD)	115,000	150,000
Sika Maint. (UD)	500,000	250,000
Young = young produced		
UD = use days		

(cont.)

**TABLE 3 : REFUGE OUTPUTS AND OBJECTIVES**

<b>OUTPUT: PUBLIC USE</b>	<b>CURRENT OUTPUT</b>	<b>OBJECTIVE LEVEL</b>
Wildlife Trails	-	-
Interpreted (AH)	3,364	7,000
Self-Interpreted (AH)	189,809	250,000
Wildlife Tours	-	-
Interpreted (AH)	22,839	32,000
Self-Interpreted (AH)	70,465	105,000
Visitor Center (AH)	17,379	148,000
Other Interpretive Exhibits (AH)	10,314	12,000
Staff Conducted Activities	-	-
Talks	3,381	20,000
Children Programs (AH)	402	720
Other Interpretation	-	-
Oil Shed Art (AH)	2,429	2,400
E.E. Staff Conducted	-	-
Teachers in Workshop (AH)	102	1,050
Teaching On-site (AH)	1,104	5,000
E.E. Non-Staff Conducted	-	-
Consortium and Others (AH)	4,285	24,060
Hunting	-	-
Sika (Gun) (AH)	4,430	5-6,000

(cont.)

**TABLE 3 : REFUGE OUTPUTS AND OBJECTIVES**

<b>OUTPUT: PUBLIC USE</b>	<b>CURRENT OUTPUT</b>	<b>OBJECTIVE LEVEL</b>
Sika (Bow) (AH)	4,468	4-5,000
Fishing	-	-
Warmwater (AH)	1,323	25,250
Saltwater (AH)	35,184	-
Crabbing	5,358	131,750
Observation	-	-
Non-motorized (AH)	302,054	400,000
Land Vehicles (AH)	274,676	350,000
Wildlife Photography (AH)	24,994	33,500
Observation Towers/Platforms	10,393	10,400





# MANAGEMENT ACTIONS

In order to attain objectives, the proposals put forth in this Master Plan balance increased habitat protection with maintenance of public use opportunities (Figure 14). Habitat enhancement and management of wildlife populations are coupled with increased wildlife-oriented use and continuation of other compatible recreation.

## Habitat Protection

- a. Acquire, when available, remaining lands currently approved for acquisition, which includes the remainder of Cedar Island.
- b. Protect additional habitat, in the vicinity of the refuge, through fee acquisition from willing sellers, conservation easements, or cooperative agreements, to provide protection for valuable wetlands, areas of high species diversity, critical, declining or vulnerable habitats, and corridors to link protected habitats.
- c. Consolidate FWS holdings within the refuge area by negotiating the exchange of approximately 418 acres of FWS-owned wetlands in Maryland for approximately 435.7 acres of NPS-owned holdings on the Virginia portion of the refuge. Ensure continued protection of all exchanged habitats and perpetuate current land uses. NPS holdings involved in the exchange will include (see Figure 15):
  - Pope Island Lifesaving Station site
  - Derrickson tract
  - Pitts Island
- d. Support, by managing as a wilderness, the wilderness proposal developed in 1974 which includes 1,718 acres of FWS land on Assateague Island. As land is acquired and based on criteria established by the Wilderness Act of 1964, review new areas for possible inclusion in the Wilderness System.

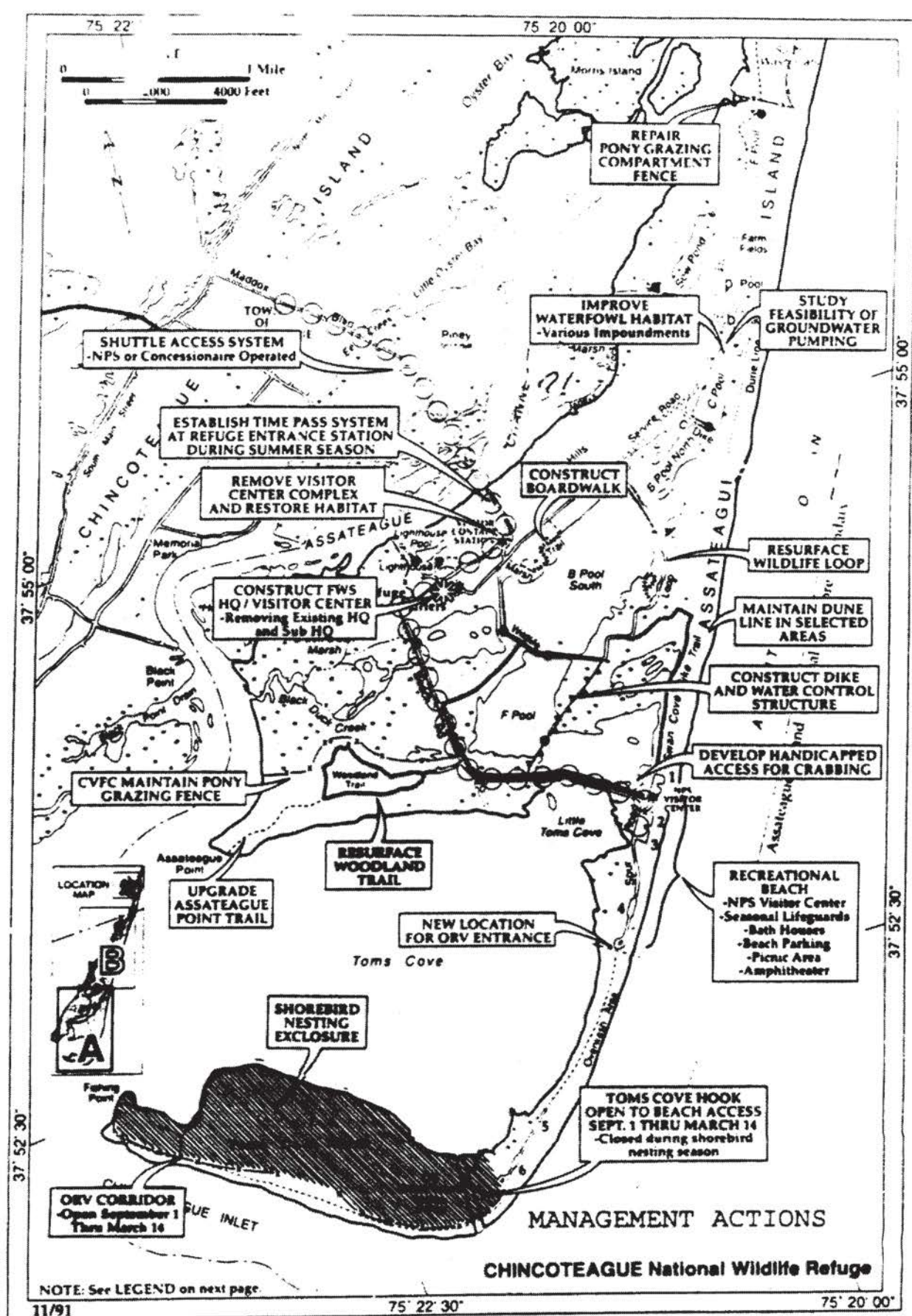


Figure 14. Map



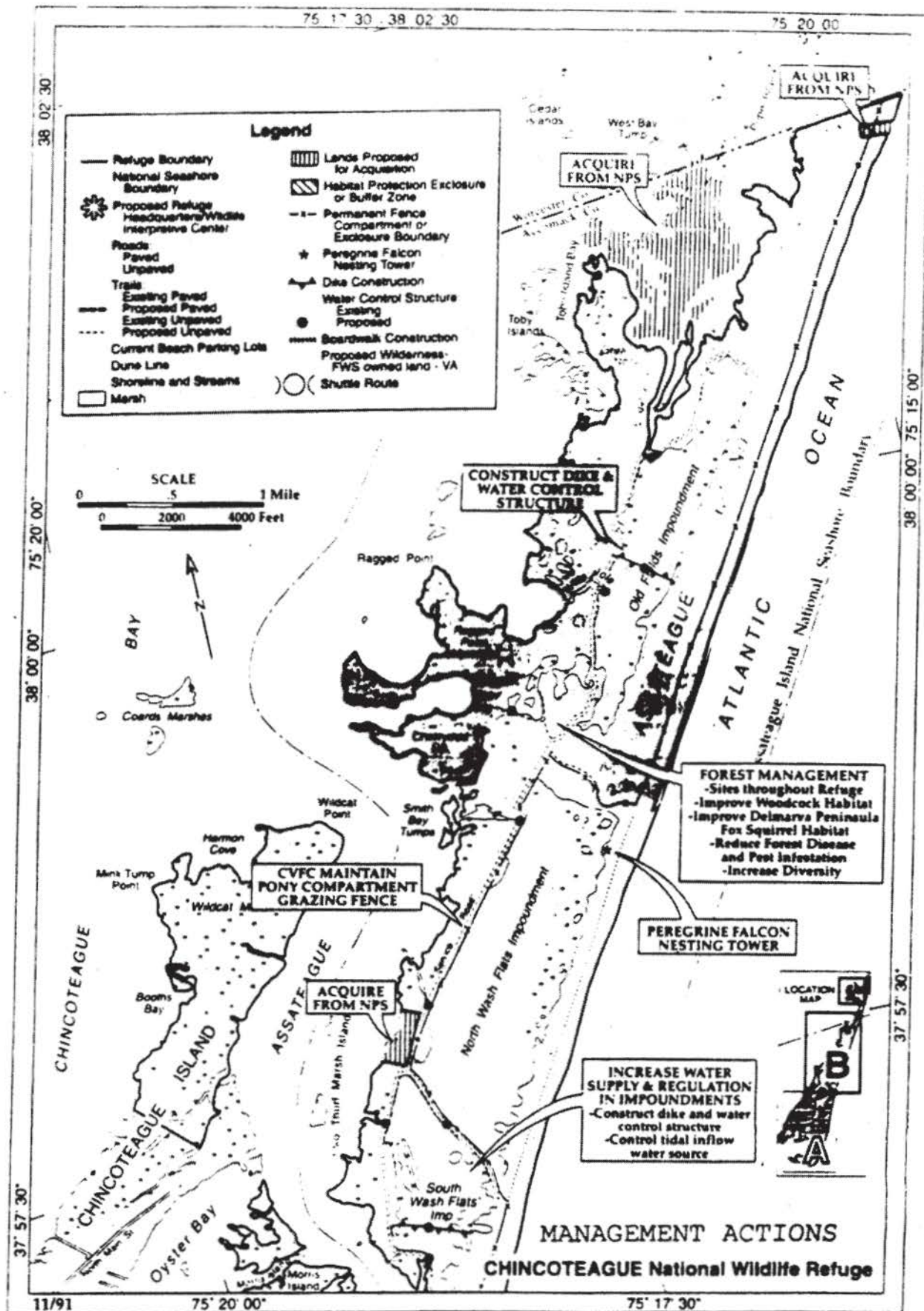


Figure 14. Map Cont'd





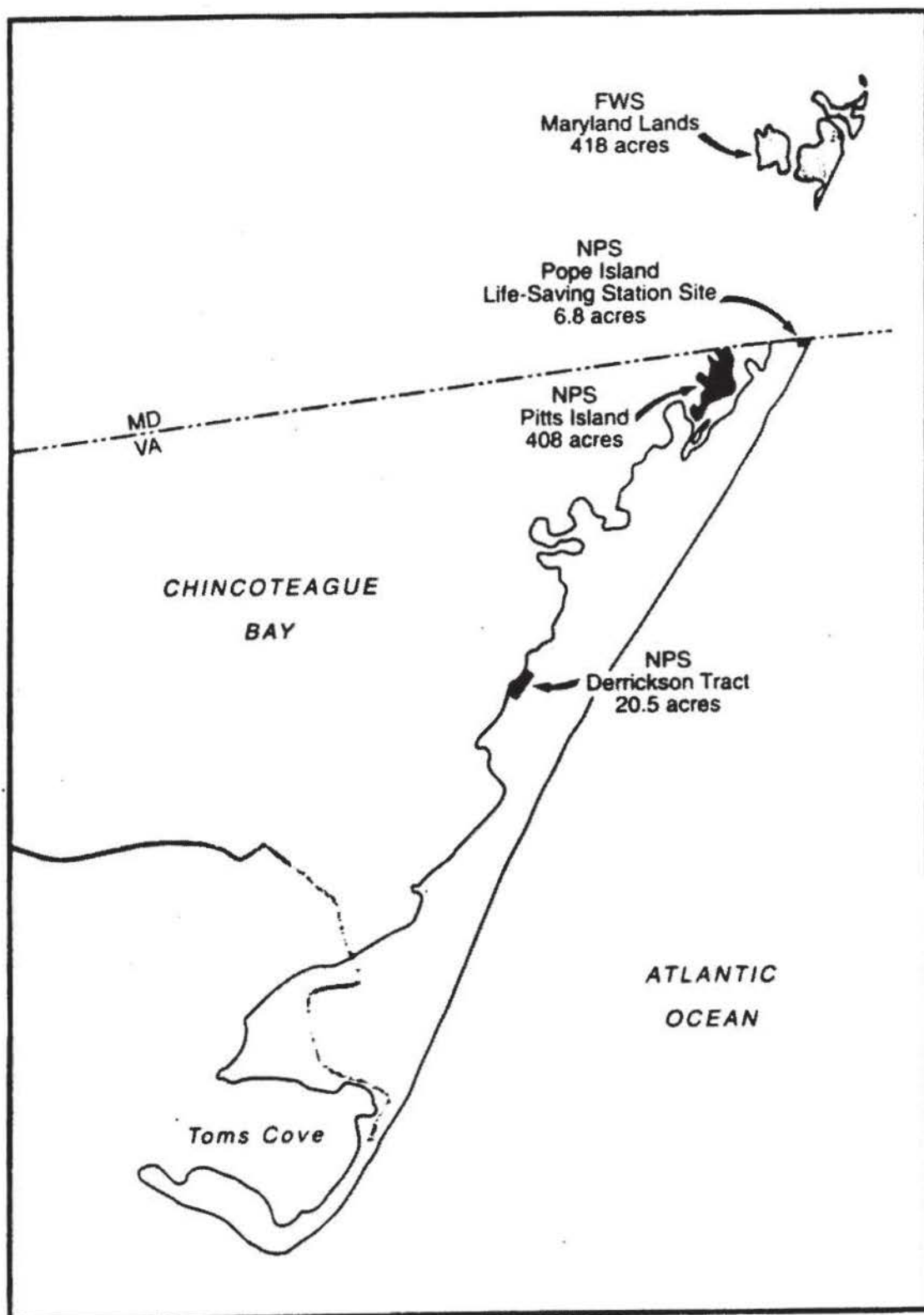


Figure 15. Proposed Land Exchange Map

# Natural Resource Management

## Habitat:

- a. Continue to increase the capability for water level control in the impoundments, taking the following steps:
  1. Manipulate impoundment water levels making annual adjustments as needed to manage for specific animal or plant communities.
  2. Use fresh water pumping between impoundments, saltwater pumping, and/or tidal flooding as water sources to maintain fresh to brackish wetland habitats during dry periods. Deepen natural drainage channels at the bayside outlets of impoundments to facilitate pumping and flooding.
  3. Maintain impoundment borrow ditches by removing debris and silt to facilitate pool drainage.
  4. Favor early successional vegetation in refuge impoundments by prescribed burning, disking, root raking, and other mechanical means.
  5. Revert approximately 30 acres in Farm Fields to wetland habitat.
  6. Subdivide Old Fields, South Wash Flats and F Pool with dikes and control structures. Repair dike and place water control structure in Lighthouse Pool.
  7. Improve drainage capability of North Wash Flats impoundment through shallow ditching if determined feasible in preventing the occasional flooding of piping plover nests.
  8. Improve drainage capability by addition of drainage devices along Beach Road and other areas as needed to avoid the flooding of forested habitats such as that which occurred during the January 1992 storm. This improved drainage will create a more natural system in this area.

9. If other means prove unsuccessful and if feasible, pump water from a deep well as a supplemental fresh water source during drought periods. Water pumped into C pool would follow a natural gravity flow into connecting pools through existing water control structures.
- b. Control phragmites in affected impoundments through combined application of approved herbicides, prescribed burning, and disking, using herbicides as a last resort.
- c. Cut and remove southern pine bark beetle infested trees as necessary to limit spread of beetle attacks. Interplant and protect from browsing mast-producing hardwoods among naturally regenerating loblolly pine.
- d. Research and develop a long-range forest management plan aimed at simultaneous redistribution of age classes, maintenance of suitable Delmarva Peninsula fox squirrel habitat, and containment of insect damage, while maintaining biodiversity. In the near term, conduct a thorough on-site assessment of forest conditions at the refuge and develop specifics of the forestry proposals. Initially design and implement a test plot program to (a) determine effectiveness of various forest management techniques for regeneration and maintenance of stands and (b) refine knowledge of habitat preferences of Delmarva Peninsula fox squirrel and other forest dwelling wildlife. If determined feasible, possible general forest management practices include:
  1. Thin overstocked stands to improve insect and disease resistance and increase mast/food production.
  2. Remove undesirable understory vegetation.
  3. Clearcut small stands or small blocks within stands to ensure continuous future mast production.
  4. Accelerate establishment of new stands following clearcutting through site preparation, control of animal damage to seedlings, and planting and protection of seedlings or saplings.
- e. Create roosting habitat for raptors adjacent to refuge impoundments by letting over-mature trees and snags stand.

- f. Maximize protection of piping plover, shorebird, tern, and skimmer nesting and feeding habitat on Toms Cove Hook. Create optimum conditions for piping plover production success by continuing to minimize those potential disturbance factors that are possible to control; the two primary possibilities include (1) controlling mammalian, avian and crustacean predation, and (2) reducing human disturbance. This will be achieved through; near-term implementation of increased predator control, continued closure of 2.5 miles of the Hook to all public access during the plover nesting season; continued posting of nesting areas on the northern refuge beach; preventing public entry in the Wash Flats and other areas where nesting may occur in the future; and monitoring to determine the level of production success in undisturbed habitat.
- g. Further protect piping plover nesting sites on Assawoman and Metompkin Island Divisions by posting nesting areas and excluding public use from March 15 through August 31. Monitor impacts of adjacent use and redirect use to less sensitive areas if adverse impacts are noted.

### **Wildlife Populations:**

- h. Protect piping plovers on Assateague, Wallops, Assawoman, Metompkin and Cedar Islands through better use of nest exclosures and increased trapping or other control methods as necessary.
- i. Protect piping plovers on Metompkin Island Division by controlling raccoons and removing all fox, since historically no fox were on this island.
- j. Maintain nest boxes for the Delmarva Peninsula fox squirrel.
- k. Maintain the peregrine falcon nesting tower near the North Wash Flats impoundment. Prevent public entry to this area.
- l. Maintain wood duck nest boxes. Phase out unused nest boxes and concentrate efforts in preferred habitat.
- m. Maintain tree swallow nest boxes.
- n. Actively reduce mute swan numbers and production on the refuge.

- o. When necessary to alleviate marsh "eat outs", disperse concentrations of snow geese from wetlands by using techniques such as pyrotechnic devices, flagging, or balloons.
- p. Establish a refuge water budget, if pumping is determined to be feasible.

### **Natural Resource Studies:**

- q. Conduct a comprehensive study and inventory of major plant and wildlife species and communities found on the refuge, to include natural heritage resources; the results of the study will be used to develop strategies for protecting biodiversity.
- r. Establish the biological benefits of changing water management within impoundments. When new water management is implemented, monitor the effects on vegetation and wildlife in affected impoundments.
- s. Based on information gathered during the 3 year piping plover study/monitoring program from 1989 through 1991, design a program that ensures effective monitoring of refuge piping plover production levels and correlates production levels with ongoing factors (such as predation attempts and storm events) that directly or indirectly affect nesting efforts.
- t. Conduct annual Delmarva Peninsula fox squirrel and wood duck nest box surveys.
- u. Participate in FWS waterfowl population studies by conducting an annual banding project, when assigned a quota.
- v. Conduct other wildlife population surveys and monitor wildlife production for selected species as directed by the wildlife inventory plan.
- w. Monitor the benefits and effectiveness of forest management in terms of achieving refuge objectives.
- x. As dictated by population declines, such as shorebirds, conduct study to determine if decline was caused by management practices, natural events or overall population decline with recommendations for reversal if possible.



- y. Conduct a study to determine the effects of grazers (sikas, resident Canada geese, and ponies) on refuge habitats.
- z. Study the feasibility of pumping fresh water from a deep well as a supplemental water source for impoundment management. Study may involve use of test wells.
- aa. Determine woodcock wintering use of the refuge by initiating a survey and live trapping program. Also determine the extent of available refuge woodcock habitat.

## **Archaeological and Historical Resource Management**

- a. Provide protection to the old Assateague Village ruins by preventing public entry.
- b. Maintain cemeteries on the refuge.
- c. Protect, secure, and maintain all archaeological and historic objects in accordance with guidance currently being developed.

## **Public Use Management**

### **Access:**

- a. Open the refuge daily 5 a.m. to 10 p.m. from May 1 to September 30, 6 a.m. to 8 p.m. in April and October, and 6 a.m. to 6 p.m. the rest of the year. Open the Assawoman and Metompkin Island Divisions during daylight hours with boat access only. Adjust hours as necessary according to administrative capabilities and habitat protection needs.
- b. Continue to collect a year-round entrance fee for public access at a permanent fee collection station.
- c. Allow motorized vehicles on Wildlife Loop from 3:00 p.m. to dusk.

- d. In the northern portion of the refuge allow foot travel on the Service Road, D-Dike, designated trails, and the beach, and by special permit, motorized vehicles on the Service Road.
- e. Allow horseback riding along the shoulder of Beach Road and the access road from the Beach Road closure booth to the ORV crossover, as well as in the ORV zone.
- f. From September 1 through March 14, allow boating access to Fishing Point, Toms Cove, and year round at Assateague Point beach. Prohibit boating in refuge ditches and impoundments.
- g. Retain the beach area along the portion of spur road that is currently accessible to two-wheel drive vehicle as a general beach recreation zone. This area comprises a 5500 foot long x 100 foot wide stretch of ocean beach running from parking lot 1 to the vicinity of parking lot 4. Support continuing access to this area for a variety of wildlife and non-wildlife oriented activities within the context of a wildlands recreation experience.
- h. Within the beach recreation zone, establish a long-range maximum beach use capacity of 4,400 visitors at any one time (i.e. one-time-use, OTU). Current levels of beach use are limited by the 961 parking spaces available in the general beach recreation zone. Assuming 3.2 people per vehicle, current use is 3,075 visitors OTU or possibly 3,300 when the visitors hiking or biking to the beach are counted. This figure represents a density of 136 square feet (sf) per visitor, well within the maximum possible OTU beach density of 100 sf per person based on sanitation codes (for cities, such as New York and Los Angeles). With no additional parking, the 4,400 visitors OTU will not be realized without some method, other than private vehicles, being established to transport visitors to the beach. This figure would be in compliance with the number of visitors current beach facilities can accommodate according to the NPS's 1982 General Management Plan for Assateague Island.
- i. Continue the closure of the lower 2.5 miles of Toms Cove Hook to all public entry from March 15 through August 31 to protect shorebird, primarily piping plover, nesting. In accordance with the 1988 Environmental Assessment on the Management of Piping Plover on Toms Cove Hook, the closure will be extended north into the oversand zone if piping plover nesting activity so dictates. The closure would also be

extended until September 15, if an extremely late nesting season occurs, whereby young piping plovers are not fledged by the end of August.

- j. Allow only wildlife oriented recreation, such as wildlife/wildlands appreciation, beachcombing, etc., north of current beach general recreation zone but not within critical shorebird nesting areas. The intertidal zone in these areas would remain open for a limited amount of hiking, unless documentation is obtained that indicates a need to close because of adverse impacts to piping plovers.
- k. Implement a series of actions to ensure effective management of beach access and use during the busy summer season (Memorial Day through Labor Day):
  - 1. Eliminate traffic lines on Beach Road by implementing a specified time pass system or other suitable system when beach parking space is filled. Visitors desiring to go to the beach when parking is full will be given a pass with a specified time when they will be allowed to enter the beach parking area, other public use areas of the refuge will remain open for their use, but they will not be permitted to wait in line at the beach until their specified time arrives. When beach parking is full, allow continued foot and bicycle access to the beach, within levels that prove to be compatible with wildlife protection and other public use activities. Once implemented, this system will be evaluated on effectiveness; if not successful another method will be developed in coordination with NPS.
  - 2. Continue private vehicle beach access as long as beach parking areas remain, and allow NPS to maintain the existing number of parking spaces (961) as long as the land base directly behind the dunes remains, realizing that this area will eventually be lost due to the natural movement of the barrier island. As natural forces reduce the land base capable of supporting the current parking, the number of spaces available will be reduced accordingly. As spaces are lost, an alternate means of transportation such as a shuttle system will need to be used.
  - 3. Encourage the establishment of a concessionaire, NPS, or Town operated shuttle transit system to provide beach access during the high use season. With current visitor use of the beach limited by existing parking, such a shuttle system would be permitted to enter

the beach area when parking is full, thereby, possibly attaining the maximum visitor OTU figure of 4,400.

4. Coordinate with the NPS and Town of Chincoteague to identify a suitable off-site beach parking area to be used once the existing beach parking is lost due to lack of suitable land behind the dunes. Once identified, the area could be acquired with federal funds or by the town. Although the loss of the existing parking will not likely occur for many years, potential parking sites on Chincoteague Island, that are close to the refuge and beneficial from an economic standpoint to the town (in that visitors to the beach would be parking in town) are being lost to other forms of development. Other areas on the refuge, outside the existing beach parking area are deemed critical in meeting the primary objectives of the refuge and cannot be considered for a massive parking area.
5. As a shuttle system is implemented, provide shuttle riders protection from hazardous weather conditions by allowing NPS to construct weather shelters for roughly 80% of peak shuttle OTU capacity. Shelters should be transportable to be responsive to the natural movement of the island.

l. Stage existing land based concession tours from the new refuge headquarters/visitor center facility.

### **Education, Interpretation, and Recreation:**

- m. Manage the Wildlife Loop to provide a self-guided interpretive tour experience.
- n. Offer seasonal concessionaire-operated interpretive land tours and boat cruises.
- o. Allow recreational activities such as wildlife and wildlands observation, photography, walking, hiking, swimming, shell collecting, picnicking, bicycling, and horseback riding in designated areas.
- p. Allow limited waterfowl hunting on Wildcat Marsh, Morris Island, and the Metompkin and Assawoman Island Divisions. In accordance with State regulations, require the use of non-toxic shot for hunters on refuge lands.

- q. Allow rail hunting on Assawoman and Metompkin Island Divisions.
- r. Allow overnight surf fishing by permit on Assateague beach.
- s. Increase environmental education programs for scouting groups, school classes, clubs, and other special groups. Develop several environmental study areas for use by school and other educational groups.
- t. Expand interpretive and educational opportunities through year-round operation of an on-refuge Visitor Center providing exhibits and auditorium programs that depict the concepts associated with barrier island geomorphology, endangered species and other refuge wildlife, seasonal variations in habitats, habitat management techniques, wildlife identification, cultural/historical resources, and the role of the FWS.
- u. Increase interpretive programs and vary presentation techniques. Update programs annually to reflect the current management emphasis. Provide a variety of walking tours guided by a refuge interpreter, as well as trail guides and interpretive pamphlets for self-guided interpretation of trails. Provide trail use and interpretive opportunities for disabled visitors.
- v. Enhance crabbing and fishing opportunities in F Pool by expanding crabbing access for the handicapped.
- w. Upgrade existing trail to Assateague Point.

### **Public Use Studies:**

- x. Develop a comprehensive data base for visitor use patterns and trends, user attitudes and preferences, and other information identified as useful for making public use management decisions. Prepare an annual summary of this information for use in management planning.
- y. Conduct studies to determine the effects of human activity on the refuge's natural resource base, focusing on human/wildlife interactions along refuge trails, Beach Road, the beach, and in endangered and threatened species habitat.



## **Cross-Program Management**

- a. Enforce federal, state, and refuge regulations designed to protect wildlife and the visiting public.
- b. Suppress wildfires on the refuge.
- c. Use volunteer service to assist in appropriate natural resource, administrative, maintenance, and public use management activities.
- d. Adjust the sika hunts as needed to minimize impacts on forest regeneration efforts and reduce the competition of the exotic sika on white-tailed deer and other native wildlife. If public hunts are ineffective in greatly reducing sika numbers, to meet objectives explore other means, such as professional hunters, to reduce this population. Conduct white-tailed deer hunts to maintain herd health when necessary.

## **Refuge Development and Maintenance**

- a. Maintain refuge boundary posts and fences.
- b. Maintain the following existing FWS facilities:
  - Maintenance shop/garage
  - Oil shed exhibition building
  - 3 residences for staff
  - 2-3 trailers as residences for volunteers
  - 20.9 miles of road (7.15 miles paved; 13.75 miles unpaved)
  - 185 non-beach parking spaces
  - 1,812 feet of boardwalk
  - 14 wetland impoundments

- 9.83 miles of dike
  - 14 water control structures
- f. Annually replace the closure fence on the Hook to prevent public entry from March 15 through August 31.
  - g. Maintain the cabled nesting enclosure on the Hook. Modify placement of fencing and signs on a continuing basis to reflect the shifting beach and dune systems.
  - h. Develop an on-refuge Headquarters and Visitor Center complex in the vicinity of the current headquarters to accommodate the general program shown below:
    - Office space for professional and administrative staffs
    - Exhibits and displays
    - Restroom facilities
    - An auditorium with a minimum seating capacity of 150
    - A multipurpose room for meetings, conferences, and workshops
    - A sales area for cooperating associations
    - A library
    - A counter/ticket sales area for the refuge tour concessionaire
    - 100 parking spaces and spaces for disabled visitors and 8 bus/trailer spaces with some overflow capability
  - i. Remove the old maintenance and storage buildings currently used as FWS office and auditorium space. Revert unused portion of this area back to forest habitat.
  - j. Remove existing Visitor Contact Station, comfort station, and associated parking and roads. Revert this area back to forest habitat.

- k. Relocate entrance to Wildlife Loop so that entry is from the new facility. Revert existing entrance to forest habitat, leaving only a bike path.
- l. Assess the need to maintain the dune line and maintain only in selected areas to provide some protection to facilities and wildlife habitat. De-emphasize this activity as impoundment drainage capability is increased to respond to storm events.
- m. Upgrade trail to Assateague Point.
- n. Maintain the section of the spur road in the vicinity of parking lots 1-4 for year-round vehicular access to the beach as feasible under future environmental conditions.
- o. Allow NPS to maintain existing facilities at the beach until lost to natural causes. Thereafter, allow replacement or construction of minimal facilities to include bath houses, visitor contact/first aid station/lifeguard office, and necessary shelters to accommodate shuttle users.
- p. Explore the possibility and if feasible relocate the Swan Cove Trail, which parallels the dune line, to a more geologically stable area.
- q. Develop and maintain the additional facilities shown in Table 4.

## **Refuge Administration and Coordination**

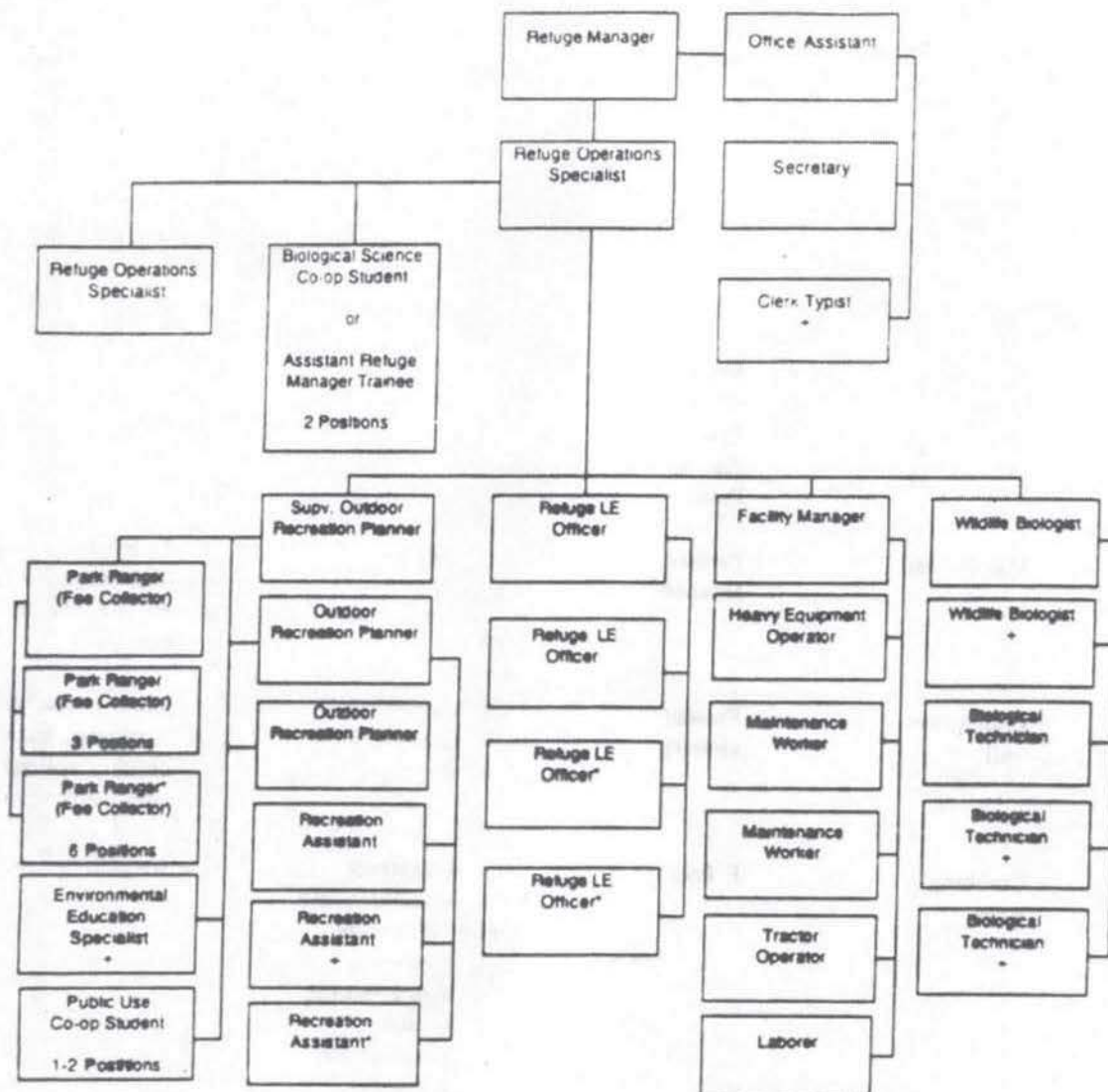
### **Administration:**

- a. Add six new positions to the refuge staff, as shown in Figure 16.
- b. Consolidate the administrative and professional staffs in an on-refuge Headquarters/Visitor Center facility.

### **Coordination:**

- c. Oversee NPS public use services at Toms Cove Hook under the current Interagency Agreement including:
  - 1. Interpretive programs focusing on the barrier island resource.

\* Temporary Positions  
+ New Positions



**Figure 16.**

TABLE 4. ADDITIONAL FACILITY DEVELOPMENT AND MAINTENANCE

Facility/ Development	Location	Level of Development	Required Maintenance
Utility Lines	Throughout refuge	Bury	Backfill & Seed
Woodland Trail	Present location	Resurface	Patch, fill
Wildlife Loop	Present location	Rehabilitate and resurface road and shoulders	Patch, fill, and shoulder maintenance
Assateague Point	SW portion of Woodland Trail to Assateague Point	Upgrade site preparation, some boardwalking	Litter pickup, brush trimming, hazard checks, upkeep of boardwalk
Marsh Trail	Present location	Additional boardwalk entire trail	Litter pickup, brush trimming, hazard checks, upkeep of boardwalk
Lighthouse trail	Present vicinity	Boardwalk entire trail	Litter pickup, brush trimming, hazard checks, upkeep of boardwalk
Crabbing Area	F Pool	Construct approximately 200 square feet boardwalking to make handicapped accessible	Upkeep and safety
Environmental study area	Boat Ramp & Black Trail	Construct rain shelter storage area	Litter pickup, brush removal, upkeep



Table 4. continued:

Facility/ Development	Location	Level of Development	Required Maintenance
Dikes	Lighthouse Pool	Upgrade	Mow, fertilize, and seed
Dikes	F Pool, South Wash Flats Old Fields impoundments, and east of B Pool	Construct 2.1 miles of dikes	Mow, fertilize, and seed
Water Control Structures	Lighthouse Pool	Install	Periodically Mow around, clear out and inspect
	In new dikes at F Pool, South Wash Flats, and Old Fields impoundments	Construct new control structures	Periodically mow around, clear out and inspect
	Outlets of F Pool, South Wash Flats, and Old Fields impoundments	Redesign and replace	Periodically mow around, clear out and inspect
Borrow Ditches	All impoundments	Dredge as needed	Periodic dredging to maintain depth
Drainage Channels	Outlets of F Pool, South Wash Flats, and Old Fields impoundments	Dredge as needed-any dredging would require a COE permit	Periodic dredging to maintain depth
Salt Water Pump	Portable	Purchase and install on trailer	Preventative maintenance and upkeep
Nesting Enclosure	Toms Cove Hook	Modify placement of cable to reflect shifting dune system	Replace posts, repair cable breaks

2. Visitor information services at the general recreation beach.
  3. Law enforcement, including controlling beach traffic flow and emergency response.
  4. Seasonal lifeguard protection.
  5. Maintenance of beach facilities including an administrative office/visitor center, seasonal bathhouses and restroom facilities, and an interpretive program shelter; redevelopment, within the current level, of facilities lost to storms or erosion will be subject to FWS approval.
  6. Maintenance of existing Spur Road and beach parking lot pavement that remains stable under future environmental conditions (up to 961 spaces available to 2-wheel drive vehicles).
  7. Allow NPS to use equipment to move sand as necessary to stabilize the dune line from parking lot 1 to 4.
- d. Work in close partnership with the National Park Service and the Maryland Department of Natural Resources to coordinate future management activities within the context of protecting the resource values of Assateague Island.
- e. Update the FWS/NPS Interagency Agreement to address the following points:
1. The formal exchange of research and resource information will be included.
  2. NPS will operate a station for lifeguard operations, first aid, and visitor contact at the beach.
  3. Other NPS functions will continue as described in the current Interagency Agreement, with minor modifications as warranted.
- f. Maintain the cooperative fire fighting agreement with the Chincoteague Volunteer Fire Company (CVFC).

- g. Encourage use of outdoor classrooms for teachers and students to be conducted on the refuge by groups outside the FWS.
- h. Continue to strengthen cooperation with the Chincoteague Volunteer Fire Company, allowing the CVFC to continue to graze, by permit, up to 150 ponies per year. Require CVFC adherence to the conditions of the permit, including secure containment of the ponies within the existing fenced compartments and normal maintenance of pony compartment fences. Continue to comply with Pony Management Plan in monitoring impacts, taking necessary actions to reduce any negative impacts to habitat.
- i. Continue to strengthen the program of active communication with the Town of Chincoteague, Accomack County, interested organizations and agencies, and promote continuing public involvement in refuge management processes. Do this through means such as press releases, entries on the community bulletin board, public review of major management proposals, dialogue with community officials and interested organizations, and refuge participation in community affairs which have direct bearing upon the refuge.
- j. Maintain a cooperative fire control agreement with the Virginia Department of Forestry.
- k. Work with the Virginia Heritage program in listing important resources found on the refuge and use their information, when compiled for the Eastern Shore of Virginia, in managing for biodiversity.
- l. Work closely with other agencies and universities in conducting needed research on the refuge and receiving the results of their research, such as the current study on neotropical birds, in order to use that information in the management and protection of biodiversity on the refuge.



# MANAGEMENT STRATEGY

This Master Plan provides general guidance and direction to the refuge manager for development of specific management plans that in turn provide for management of the dynamic nature of both wildlife and public use. Management plans are developed or revised, as necessary, to reflect the needs of wildlife. In certain cases, annual programs are prepared to fine tune the management of wildlife or public use, such as water management, predator control, hunting, etc. In addition, individual projects are identified through the Refuge Project Planning System, with the most current listing of projects being maintained in the refuge files. Current plans and programs are also maintained in the refuge files. Current management plans include:

- Marsh and Water Management Plan
- Upland Habitat Management Plan
- Predator Control Plan
- Pony Management Plan
- Wildlife Inventory Plan
- Fire Management Plan
- Public Use Plan
- Public Use Plan, Assawoman and Metompkin Island Divisions
- Hunt Plan

A Synopsis of the Major Plans Follows:

## Marsh and Water Management Plan

Wetland habitats comprise over 54 percent of the total refuge; over a third are classified as freshwater impoundments and marshes. This plan was developed to provide guidance in the management of both the impoundments and salt marsh. Periodic programs are developed to fine tune wetland management.

In an effort to increase the quality and quantity of available habitat for waterfowl, the refuge began, in the early 1950's, construction of a series of freshwater impoundments, of which 14 are currently under active management (See Table 5). Management of these impoundments, which total approximately 2,650 acres, is directed at providing diverse habitat types through water level manipulation on prescribed cycles to attract and



TABLE 5. Impoundments and Water Control Structures				
IMPOUNDMENT	SIZE		YEAR	
	ACRES	HECTARES	IMPOUNDMENT CONSTRUCTED	STRUCTURE REPLACED/INST
A POOL	105	42	1952	1952
B POOL (S)	371	150	1952	1981
B POOL (N)	94	38	1952	1992
C POOL	69	28	1954	1981
D POOL	16	6	1954	1993
E POOL	26	11	1962	1980
F POOL	409	166	1962	1962
LIGHTHOUSE	7	3	1963	1988
SOW POND	48	19	1963	1981
WASH FLATS (N)	793	321	1963	1980
WASH FLATS (S)	279	113	1963	1980
RAGGED POINT	38	15	1964	1981
OLD FIELDS	368	149	1954	1981
FARMS FIELDS	35	14	1992-93	1993
TOTALS	2,658	1,075		

benefit a diverse group of wildlife particularly waterfowl, marsh and water birds, and shorebirds.

Extensive saltmarshes, which total over 4,800 acres, are located along the western boundaries of Assateague, Assawoman, Metompkin, and Cedar Islands, on the north end of Chincoteague Island (Wildcat Marsh) and the majority of Morris Island. Management of this estuarine habitat is focused mainly on protection and natural succession rather than active manipulation.

The primary objective for marsh and water management is to provide a variety of habitats for a diversity of wildlife species during the different seasons of the year. Specific habitat objectives include:

1. Provide nesting habitat for the threatened piping plover within the North Wash Flats impoundment during the early spring and summer nesting season.
2. Provide specific habitat requirements for early fall migrating waterfowl (blue-winged teal), late fall migrants (tundra swan), winter thermoregulatory areas for waterfowl and other water bird species (great-blue heron), and wintering waterfowl feeding, loafing, and roosting areas.
3. Provide important shorebird habitat during the spring and summer/fall migration as part of the refuge's obligation to support the Western Hemisphere Shorebird Reserve Network.
4. Maintain biological diversity.
5. Provide, enhance, and maintain a diversity of wetland habitats for the refuge's indigenous species of wildlife and plants.
6. Provide opportunities for compatible wildlife-oriented recreation, observation, and interpretation.

These objectives will be accomplished through a variety of management activities including protection, water level manipulation, suppression of woody vegetation encroachment, prescribed fire, chemical application, mechanical removal of undesirable vegetation, and the creation and restoration of wetland habitats.

Management activities will be conducted for groups of species at appropriate times of the year to ensure available habitat conditions at critical periods. Some possible management strategies for meeting the established objectives include:

1. **Piping Plover Management**

In order to provide nesting habitat for the piping plovers in the North Wash Flats impoundment, dewatering must begin in late winter

(March 1) and remain at < 35% water coverage through July. A variety of management techniques (e.g. disking, grazing, etc.) may be used to maintain sparse vegetative coverage.

## 2. Waterfowl Management

Spring water level manipulation for waterfowl management is to provide moist soil conditions conducive to the production of preferred waterfowl food plants. The gradual dewatering of certain impoundments begins mid-April through mid-June depending on the desired plant response. Typically the earlier drawdowns favor sedges, smartweeds, and bullrushes, with the later drawdowns favoring grasses.

Late summer and fall water level manipulation is used to make natural foods available for waterfowl. Gradual refloodings tend to make foods available over a longer period of time. A late summer reflooding provides desirable feeding sites for early fall migrants, such as teal; while fall and gradual reflooding produces feeding conditions conducive to later migrants and to wintering waterfowl.

Maintaining certain impoundments with high water levels year round (e.g. F Pool) and flooding very large impoundments (e.g. North Wash Flats) during the fall migration create excellent roosting and loafing sites. Additionally, Thermo-regulatory areas for waterfowl can be maintained by allowing woody vegetation to remain within the certain impoundments or by raising the water level in order to flood adjacent wooded areas.

## 3. Shorebird Management (Excluding Piping Plovers)

Shorebirds require habitat conditions that provide high energy feeding sites during the migration. Enhancement of impoundments for spring migrants can be accomplished through drawdown (late March to early May) to expose invertebrate rich areas. A late summer shallow reflooding of some impoundments can provide early fall migrant (late July thru August) feeding sites.

In impoundments where the drawdown is completed early, spring disking is appropriate for improving feeding conditions for shorebird species that glean for their food rather than probe. Late fall and early

winter shallow disking improves feeding habitat for shorebirds which probe for their food.

#### 4. Vegetation Management

Impoundment disking can be a means to not only retard undesirable plants (fleabane and cocklebur) but also provide a nutrient base (increase organic content) and contribute to an increase in soil fertility for better plant growth. Habitat diversity may be maintained by either disking, mowing, or burning, in either the natural marsh or within the impoundments.

#### 5. Water Management (General)

Management and drawdown of the southern pools complex (D → C → B North → B South → F and A, with F draining to Toms Cove and A to Black Duck Marsh) requires coordination of each pool's requirements and occasional changes to drawdown initiation dates.

#### 6. Marsh Management

For the most part, the extensive and fragile saltmarshes have not been actively managed in the past but left to natural succession. Limited mowing has been used to retard woody encroachment in Black Duck Marsh. Recommended management for this sensitive habitat is to continue only limited management. In addition, limiting public access and providing specific routes of travel for clammers and naturalists will reduce the negative impact of trampling marsh vegetation while providing the public with consumptive and non-consumptive wildlife oriented activities.

## Upland Habitat Management Plan

Approximately 25 percent of the refuge, 3,440 acres, is composed of shrub and maritime forest habitat. Refuge forest stands vary from sparse 20 year old stands to heavily stocked stands more than 75 years old. The majority of shrub habitat is less than 20 years old and is scattered throughout the refuge with most adjacent to the forests, saltmarshes, and impoundments. The primary purpose of this management plan is to summarize the data

base, develop the land management strategy, and explain the rationale which will guide future upland habitat management on the refuge. This plan was designed to benefit all wildlife species on the refuge, with special emphasis on the endangered Delmarva Peninsula fox squirrel, American woodcock, neotropical migrants, and cavity nesting birds.

In the early 1960's, attention was focused on forest management. A forest management plan was approved for the refuge in 1963 (FWS 1963). However, no forest or habitat management followed for the next two decades, except limited prescribed burning. In 1983, southern pine beetle tree mortality was detected in loblolly pine stands. Suppression of the outbreak began in September of that year. Sixty acres were clear-cut near Black Duck Marsh. At that time it was decided to prepare a new forest management plan. In 1985, Bardow and Carter conducted forest evaluations and made recommendations for management. The plan was completed in 1992.

The upland habitat management objectives for Chincoteague National Wildlife Refuge are:

1. Maintain and expand habitat for the endangered Delmarva Peninsula fox squirrel.
2. Provide habitat for other upland wildlife species, especially the American woodcock, neotropical migrants, and tree cavity nesting birds.
3. Maintain biological diversity.
4. Minimize the risk of continued loss of pine forest habitat to the southern pine beetle and other forest insect pests.
5. Allow public recreation where consistent with the refuge upland habitat management objectives.



This plan describes planned operations and outlines long-term objectives. Periodic programs and prescriptions will be supplemented as conditions or operational capabilities change. The refuge has been divided into 12 compartments. In attaining the objectives the following general guidelines will apply:

Tree species on the refuge which are important in providing habitat for the squirrel are those currently found in the Loblolly Pine forest type. The mixed hardwoods found in this forest type will be favored at the expense of pure loblolly stands. The mixed hardwood forest provides premium fox squirrel and woodcock habitat. The hardwood stands have developed only in areas where topography and distance from salt water provide maximum protection from aerosol salt spray. On these sites sufficient time must have passed to allow plant community succession to proceed from dune grasslands through the loblolly pine stage.

Hard mast-producing trees will be favored including the southern red oak and water oak. Red maple, American holly, black cherry, black gum, and persimmon are soft mast producing trees to be favored as important food producers for the fox squirrel. These hardwoods and others of this type are also important to squirrels as a source of buds, used as food during early spring, and nest cavities for both squirrels and cavity nesting birds.

The shrub habitat adjacent to the freshwater impoundments and the transition zone between the forest and salt and fresh water marshes provides important foraging and nesting habitat for a variety of neotropical migrants. These areas consist primarily of myrtle (wax and bayberry) winged sumac, and groundsel tree which will be manipulated or protected to provide favorable foraging areas and as travel corridors from one habitat to another.

## **Predator Control Plan**

Management activities used on the refuge to enhance species-specific productivity naturally benefit opportunistic predator populations as well. Mammalian predation (red fox and raccoon) has been identified as a major factor limiting the reproductive success of both nesting waterfowl and shorebird populations. Although not as significant as mammalian predators, ghost crabs and avian predators (fish crows, herring gulls, boat-tailed

grackles) also have the potential to seriously affect the productivity of nesting shorebirds.

Of special concern to the refuge is the impact predators have already had on the reproductive success of the threatened piping plover. The continued influence of predators on the nesting success of sensitive wildlife populations emphasizes the need for a comprehensive predator management program for the refuge.

The overall objective of the predator management program is to control the detrimental impacts high populations of predators have on achieving refuge objectives. Specific management objectives include the following:

1. Control red fox, raccoon, and where necessary, ghost crab and avian predators (fish crows, herring gulls, boat-tailed grackles) to improved survival of nesting populations of piping plover, as well as terns, skimmers and waterfowl.
2. Control raccoons to reduce the threat of nest box competition with the fox squirrel and possible outbreak of disease from high population densities.
3. Maintain plover nest losses to predators at less than 10% within all plover nesting areas.

The successful management of specific target predators on the refuge is expected to involve the simultaneous use of several control methods including trapping, predator exclosures around nests, aversion control, birth control, and if necessary selective shooting.

## **Pony Management Plan**

Management of non-resource related activities has been a continuing program since initial establishment of the refuge. Livestock grazing was one of the first activities permitted on the refuge. Early refuge files indicate local livestock owners were permitted to graze cattle and horses on designated portions of the island for an annual fee. Domestic livestock has long been a part of Assateague Island's history from the time the Eastern Shore was settled during the early 1600's. Early accounts of grazing

horses and other livestock on barrier islands indicate this was a common and widespread practice all along the Atlantic Coast. Periodic roundups and so called "pennings" were often held to determine ownership, and to count and sell excess or unwanted stock. Since the early 1920's the Chincoteague Volunteer Fire Company has had an annual roundup of ponies from Assateague Island, with the ponies being swam across the channel to Chincoteague Island (Wroten 1972).

One local private permittee (Lyle Maddox) was the first to acquire a grazing permit for 150 head of cattle and horses. In the spring of 1946, the Chincoteague Volunteer Fire Company was permitted to also graze approximately 150 head of horses they obtained from Wallops Island (John Buckalew, pers. comm.). Both permittees continued grazing livestock on the refuge until about the early 50's, when the Fire Company became the only permittee. No other grazing permits have been authorized.

Primary objectives of this plan are to:

1. Establish firm and realistic responsibilities of the Chincoteague Volunteer Fire Company for management of ponies (Chincoteague Pony) on Chincoteague National Wildlife Refuge (Assateague Island).
2. Create workable livestock management grazing compartments (units) in order to protect wildlife habitat, provide reasonable grazing areas, provide adequate forage, and provide safe viewing opportunities for the visiting public.
3. Provide increased protection for waterfowl habitat management areas during the months critical for waterfowl food production, breeding and wintering.
4. Exclude ponies from critical shorebird nesting areas so as to have no shorebird nest losses due to ponies.
5. Ensure that the ponies permitted on the refuge are properly cared for and receive the attention afforded normal livestock by responsible owners.
6. Establish a grazing fee that is reasonable, yet not excessive for grazing livestock on the refuge.

7. Outline maintenance and compartment upkeep responsibilities for the Fire Company and the FWS.

The present grazing management compartments include the Black Duck Marsh Unit which totals approximately 650 acres and the Northern (pony fence to MD/VA line) Unit which is approximately 3,400 acres.

A Special Use Permit to be issued by the Refuge Manager for authorized grazing of specified compartments will run on a fiscal year basis (October 1 thru September 30). Permit conditions may, at the discretion of the Refuge Manager, be changed annually as needed to meet the objectives of this plan.

Compliance with these permit conditions will be the responsibility of the Fire Company's Pony Committee; however, the permittee who is either the President of the Fire Company or the Chairman of the Pony Committee, will be ultimately responsible for the conduct of all Fire Company members.

## **Fire Management Plan**

This plan is used to guide a very limited prescribe burning program. Several prescribe burning techniques can be employed to manipulate different habitat types for control of undesirable vegetation and to increase desirable types.

### **Prescribed Woodland Fire**

The main objective concerning forest lands is to create and maintain optimum wildlife habitat conditions through sound forest management. Prescribed burning is considered an important and necessary phase of this management program.

Overstory crown densities allow sufficient sunlight penetration for wildlife food production on the forest floor. The understory consists of grasses, forbes, pine needle litter, deciduous shrubs, small deciduous trees, and some non-deciduous shrubs. As these understory shrubs mature, the amount of food available to wildlife declines, the palatability of the browse declines, and the nutritional value of the browse declines.

Without prescribed burning wildlife habitat and food sources may disappear, palatable grass for grazers will be reduced or eliminated, accessibility for



hunting and forest management will be reduced, and the possibility of damage as well as air and water pollution from wildfires will increase drastically. Prescribed burning also helps prevent arbor diseases.

Fires will be prescribed by the wildlife biologist to improve habitat conditions. In some areas a heavy mat of pine straw covers the forest floor, thus preventing the establishment of low-growing herbaceous plants. This rough condition can be corrected by prescribed fire. Unpalatable brush and litter will be removed by fire, allowing production of palatable new plants and sprouts. Desirable wildlife food plants such as legumes, grasses, and forbes are plant species which typically show an increase after burning pine forests. Seeds and insects are also more plentiful on burned areas.

The Delmarva Peninsula fox squirrel prefer a forest habitat with an open understory. Prescribed burning will remove the congested brush buildup which has occurred and thereby increase benefits to the endangered fox squirrel. Nesting conditions and mobility are greatly improved. Big game hunting conditions and hunter success should also be improved.

### **Prescribed Marshland Fire**

Natural Fire has always been an important factor in the ecology of coastal marshes. Marsh burning is now an accepted management practice on practically all of the coastal waterfowl refuges. The benefits derived from the prescribed burning of marshes contribute to one of the primary purposes of Federal refuges - that of providing adequate food supplies for large numbers of wintering waterfowl.

One purpose of marsh burning is the removal of dense vegetation and accumulated litter. Most marshes in the southeast, because of the coarse plant species involved, long growing seasons, abundant precipitation, and other factors, quickly build up a "rough" that, unless removed, limits the growth of desirable food plants, precludes waterfowl use, and creates a fire hazard during periods when burning is not desirable.

Burning can also be used effectively to prevent encroachment of brush species such as wax myrtle and groundsel tree.



As burning alone rarely controls undesirable plant growth more than temporarily, it should be used in conjunction with other practices to obtain more effective control of pest plants. Burning can be very effective when used in combination with disking and/or deep flooding.

## **Public Use Plan**

A primary focus of this plan is to improve the organization and efficiency of the refuge public use program. Certain aspects of the plan are tentative because of the possibility of a new interpretive center/administrative complex that, if built, will affect the completion of certain projects and result in the development of others.

Below is a brief summary of the proposed actions to manage and improve the refuge's public use program. Details are provided in the body of the plan.

1. Increase public use efforts both on and off refuge through more news releases, visitor orientation materials/services, agency/group contacts and exhibits.
2. Obtain updated information on visitor use patterns through a detailed study and the installation of trail counters.
3. Promote outdoor classrooms on the refuge by continuing the cooperative FWS/NPS environmental education (EE) program. Increase efficiency by offering more workshops and self-guided support materials.
4. Evaluate and implement interpretive projects to increase self-guided interpretation while improving the efficiency of the current level of programs offered through expanding advertisement efforts.
5. While maintaining strong support for the cooperating association, refocus and intensify efforts to help the organization become better organized and prepared to increase financial support for the refuge and begin developing refuge-specific information for visitors.

6. Professionally develop or upgrade all refuge maps, flyers and brochures.
7. Maximize efforts toward the planning and development of a new interpretive center/administrative complex for the refuge.
8. Develop new areas (i.e. pull-offs and EE study areas), upgrade trail areas, to increase visitor safety, reduce wildlife/people conflicts, provide increased educational opportunities and help visitors better enjoy wildlife-oriented recreational experiences.
9. Provide increased monitoring of public use activities to better meet and plan for visitor needs and demands, to ensure program objectives focus on the refuge's station message.
10. Substantially upgrade hunt materials and ensure that orientation programs are self-guiding to the extent possible.
11. Upgrade various refuge facilities and routes to increase visitor safety, area appearance and program efficiency.
12. Increase staff contact and coordination with outside organizations and groups involved in interpretation, environmental education, recreation and other public use work.
13. Purchase and install various supplies and equipment to help save staff time and facilitate more efficient programming efforts.
14. Allow various wildlife and non-wildlife oriented recreation activities to continue at current levels with increased efforts to monitor certain ones for significant wildlife impacts that may require future adjustments to activity levels.
15. Evaluate over time and adjust, if appropriate, ongoing aspects of the program (i.e. visitor center hours, concession tour schedule, wildlife loop hours, waterfowl week activities).
16. Increase interpretative training opportunities for employees so as to improve the variety and professionalism of programs offered.

17. Increase staff exposure and participation in current resource management activities.

The Public Use Plan is written in response to specific regional guidance (USFWS, 1988) that identified the following public use management goals:

1. Accommodate public uses compatible with fish and wildlife management.
2. Maximize public recognition of the Fish and Wildlife Service and its mission.
3. Explain the purpose(s) of a field station to members of the public who have an interest in that station.
4. Maximize the quality of each field station visit.

The plan identifies issues, objectives and appropriate strategies for managing public use activities on the refuge. The plan covers a 3-5 year period and is adjusted annually to reflect accomplishments, shifts in FWS priorities, visitation trends and other changes. Each adjustment covers the next 3-5 year period.

Public Use Issues Include:

1. Methods for determining refuge visitation and visitor interests need to be updated to better determine what is actually occurring on the refuge and why.
2. A significant amount of public misunderstanding exists about refuge goals and activities. In addition, the Chincoteague National Wildlife Refuge is commonly viewed as more of a "beach refuge" than as a wildlife refuge.
3. Non-wildlife oriented public use occurs on the refuge. While these activities may disturb wildlife and consume some staff time, it might not be feasible or prudent to substantially curb these uses. The need exists, therefore, to upgrade these activities with more wildlife opportunities and information to increase their contribution in accomplishing refuge objectives.

4. The refuge EE program should continue as a cooperative FWS/NPS educational program. Efforts should be more efficient by increasing support materials and workshops.
5. People engage in a variety of public uses (walking, bicycling, driving, photography and wildlife observation) at the same time, both along the Wildlife Loop and the beach road. The amount of these activities may be negatively impacting wildlife, as well as, the quality and safety of the experience for visitors. Therefore, it needs to be determined if modifications can be made to reduce these impacts and hazards.
6. Refuge facilities and support materials are not presently adequate to operate the public use program at Service standards. This is especially true for the contact station that is experiencing a continual and dramatic rise in visitation.
7. An increase in staff training, program planning and activity preparation is needed to maintain high quality in all aspects of the public use program.
8. Inadequate facilities, demands of the program and cross divisional communication problems hamper staff efforts to ensure that adequate, and correct information is conveyed to visitors. The refuge should continue to develop procedures to ensure that the necessary information is consistently identified, documented and passed on to visitors.
9. Visitors feeding and otherwise interacting with wildlife is a problem that needs continual attention to help reduce safety and health concerns for both people and wildlife.
10. The hunt registration program works well and problems with refuge hunters have been minimal. However, efforts should continue toward maximizing the efficiency and quality of the hunt program.
11. Refuge public use efforts need to be assessed and perhaps reorganized or changed in an attempt to reach a higher number of refuge visitors with the Station Message.

12. Historically, the refuge has had an image problem that, among other things, contributed to poor community relations. Although the situation has improved tremendously,, public relations efforts should be expanded to help eliminate confusion about the role of the Service and strengthen the public image of the refuge.
13. Public information efforts must routinely convey to the public:
  - information related to the Station Message
  - the reasons for refuge regulations
  - the reasons for altering or changing public use and management activities
14. Interaction with local, state, federal and private organizations involved in public use and information should be expanded to facilitate more effective programming and public outreach efforts.
15. Volunteers, the Chincoteague Natural History Association and the concessionaire are important resources that help determine the level of the refuge public use program. Refuge support for these resources should be maximized to the extent possible without negatively impacting the resource.
16. Visitors cannot always easily obtain information they may need or want. Although new signs and exhibits have improved the situation, attention must still be given to upgrade the refuge's written materials, increasing program advertisement, and otherwise improve orientation for refuge visitors.
17. The refuge has numerous opportunities to expand the variety of self-guided and conducted "field experiences" for visitors, thereby enhancing their opportunities to observe and learn about wildlife.
18. The potential exists for increased wildlife oriented public use on the refuge during the non-summer months.
19. The majority of the visitors come to the refuge to go to the beach at the NPS assigned area. The number of vehicles passing through the refuge often causes congestion and backups which could disturb wildlife and cause safety concerns. A shuttle system will be encouraged to prevent these backups. However, until that occurs,



plans are in effect to implement a time pass system, whereby vehicles will be allowed to go to the beach area during certain designated intervals. Other plans to eliminate the backups will be investigated.

20. Only wildlife oriented recreation, should be allowed such as wildlife/wildlands appreciation, beachcombing, etc., north of current beach general recreation zone but not within critical shorebird nesting areas.
21. The establishment of a concessionaire, NPS, or Town of Chincoteague operated shuttle transit system should be encouraged to provide beach access during the high use season.
22. Coordinate with the NPS and Town of Chincoteague in identifying a suitable off-site beach parking area to be used once the existing beach parking is lost due to lack of suitable land behind the dunes.

The Objectives of the Public Use Program are to:

1. Provide opportunities for visitors to observe and/or learn about the following while participating in a diverse range of wildlife-oriented recreation activities:
  - the life history, habitat needs and refuge management of species that inhabit wetlands
  - the variety of refuge upland habitats, their importance for wildlife and management programs that maintain the diversity
  - the history and management of threatened and endangered species on the refuge
  - the ecology importance of barrier islands
  - refuge hunt and predator management programs
  - the mission of the refuge and the Fish and Wildlife Service
  - the reasons for refuge regulations

- the reasons for altering or changing public use and other management activities
  - wildlife and cultural resources unique to the refuge
2. Provide high quality facilities, resources and programs that give visitors a positive wildlife-oriented experience not adversely affected by other users.
  3. Provide quality training, materials, study sites and other support for refuge educational programs that focus on fish and wildlife and their management.
  4. Provide each hunter with a high quality hunting experience that includes the opportunity to learn about waterfowl and deer management on the refuge.
  5. Provide local residents, visitors and the general public with regular information about refuge wildlife populations, natural history and management activities through an active and diverse public outreach program.
  6. Ensure that all visitors can easily obtain the basic refuge information and regulations necessary to have a safe, enjoyable experience that does not adversely affect the resource.

## **Hunt Management Plan**

### **Sika and White-tailed Deer:**

Sika (Oriental Elk) were originally introduced to Assateague Island in the early 1920's. A small number was released on the island's north end and over the years the herd increased and spread throughout the island. The herd was well established on the Virginia end of the island when the refuge was created in 1943. Adequate habitat, minimal disturbance, and no natural predators resulted in a continual increase in the herd's population.

By 1963, the sika population was believed to be nearing the refuge's carrying capacity, containing approximately 1,050 animals. This estimate was based on trapping and tagging studies, night surveys and track count

studies. Since very little was known of the life requirements of sika, proper population density was not known. However, if compared to the white-tailed deer, the population density was considered too high. A reduction in habitat was also occurring due to development of additional waterfowl habitat, thus population density was becoming more restricted. Depredation upon refuge farming operations was resulting from a large sika population. During the winter of 1962-63 a browse line became apparent.

In 1963, a big game hunt plan was prepared and implemented. The years since have seen many changes in the deer hunt program. Harvest limits have changed; deer populations have fluctuated; and habitat conditions have changed as did season lengths and hunter qualification requirements. The early hunts were designed mainly to control the sika herd. As the whitetail population increased, this species too was added to the harvest.

In 1987, the decision was made to not hunt whitetails since the sika appeared to be out competing them. This action has continued through the 1993 season. Also in 1987, the State deregulated sika, allowing the refuge to set its own season and limits. Each year the herds are evaluated, after which species hunted, season lengths and bag limits, are determined.

## **Waterfowl and Rail**

The Wildcat Marsh unit of the Chincoteague National Wildlife Refuge was purchased in 1983 and a waterfowl hunting program was developed the next year. Morris Island and the Assawoman and Metompkin Divisions of the refuge were also acquired. Waterfowl hunting on Morris Island and waterfowl and rail hunting on Assawoman and Metompkin Divisions were continued as long-standing traditional wildlife oriented uses.

### **The objectives of the refuge hunting programs are:**

1. Maintain big game wildlife populations at levels compatible with the refuge habitat.
2. Reduce the exotic big game population in order to lessen the competition and maintain the health of the indigenous big game population.

3. Reduce competition between sika and waterfowl and other wetland species.
4. Provide the general public with an opportunity to utilize a renewable natural resource.

The big game hunting program directly supports the station's objectives by maintaining herd size in order to maintain wildlife habitat, favoring an indigenous species over an exotic one, and providing for wildlife oriented public use. The waterfowl and rail programs provide for wildlife oriented recreation.



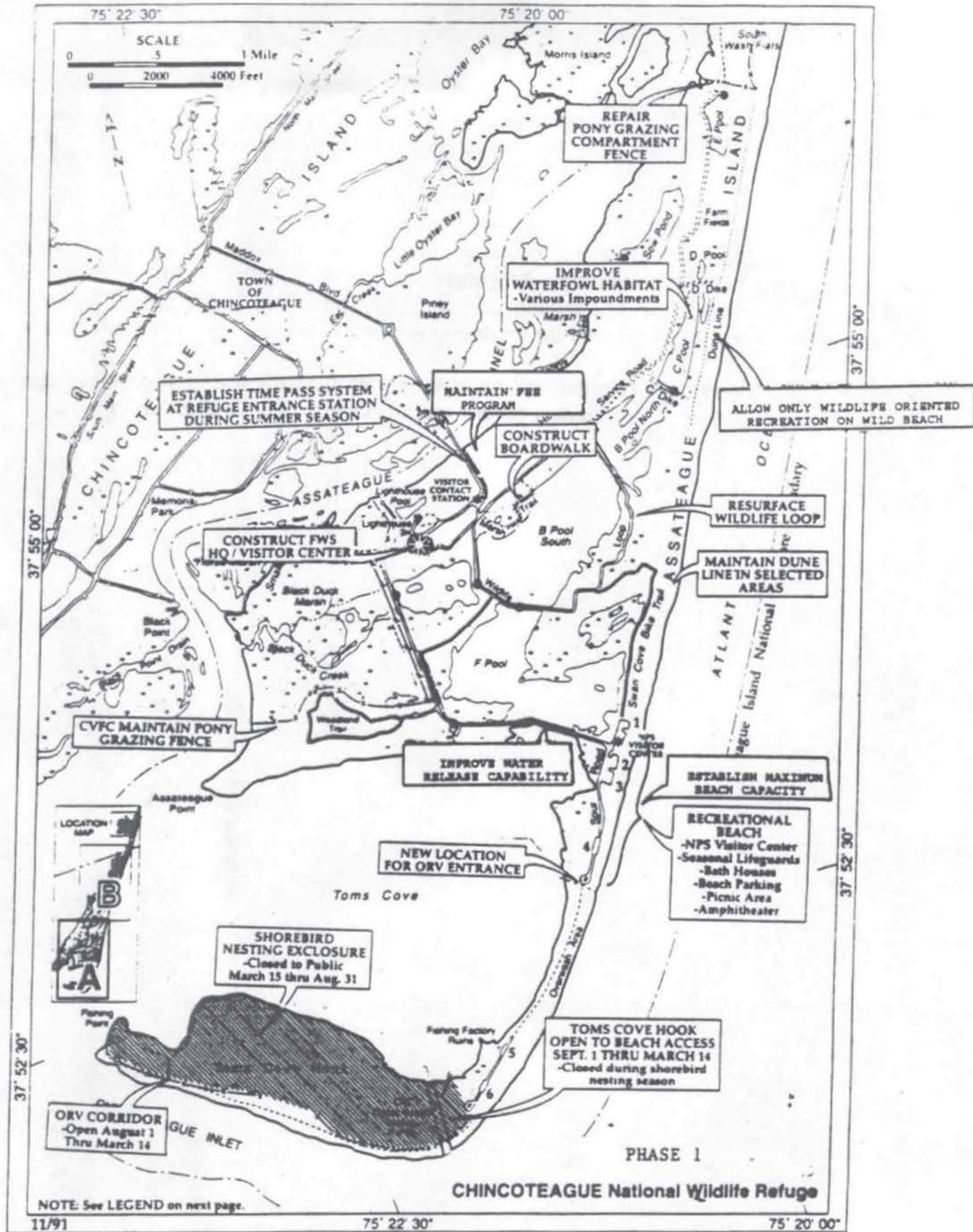


Figure 17 Map



## Master Plan Phasing

The Master Plan Phasing Map (Figures 17 to 19) identifies the sequence of actions in implementing the refuge objectives. Phasing decisions are a direct outgrowth of the planning process.

Although the timing of management and development actions will depend on budget appropriations, the phasing map clearly indicates which projects should receive priority in funding. All Phase 1 projects should be initiated, and completed whenever possible, before beginning Phase 2 projects. Likewise, Phase 2 projects should be implemented before Phase 3 projects are initiated.

The only exception to this will be in situations where lower cost projects from one phase might be funded before major projects from a higher phase.

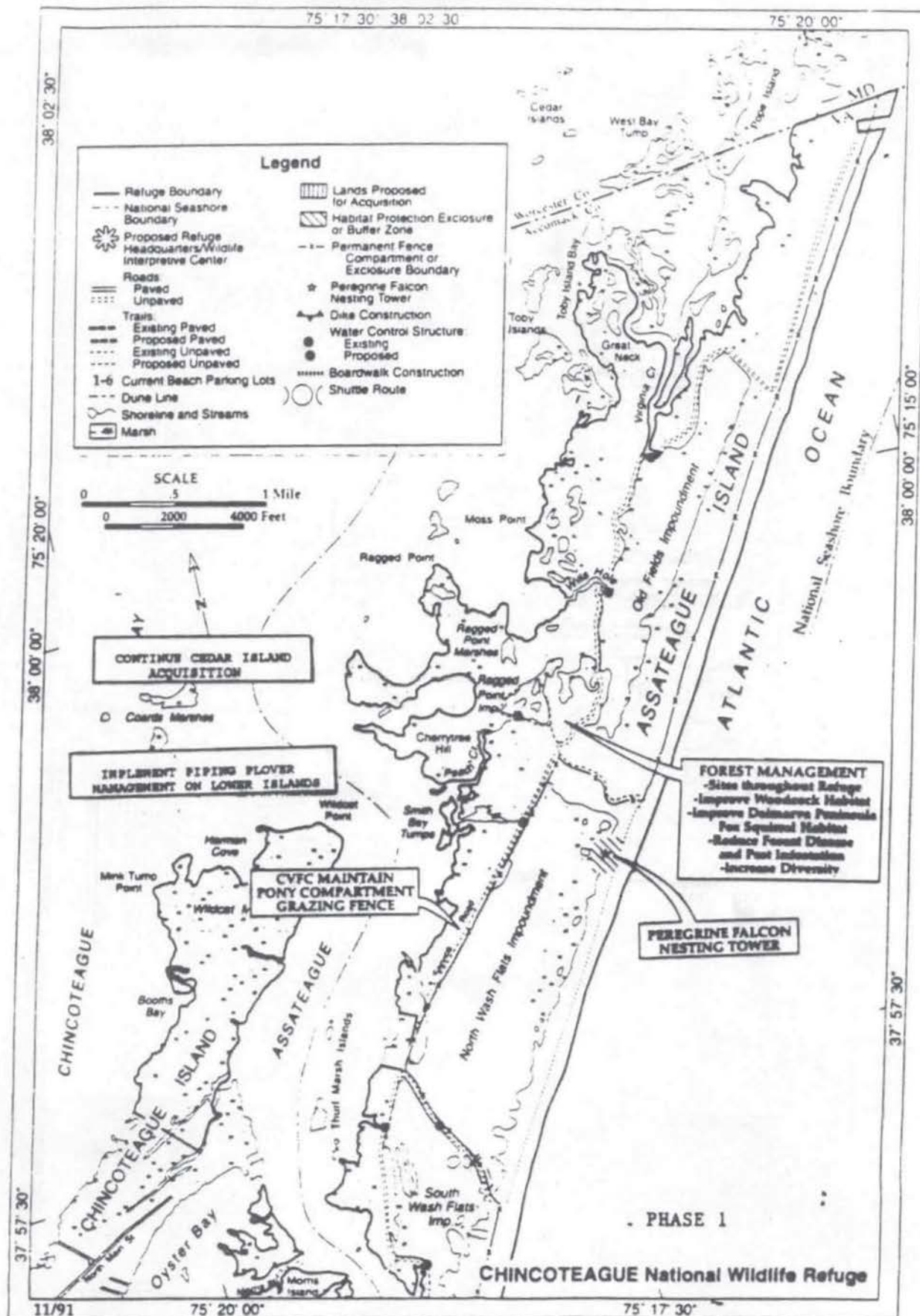
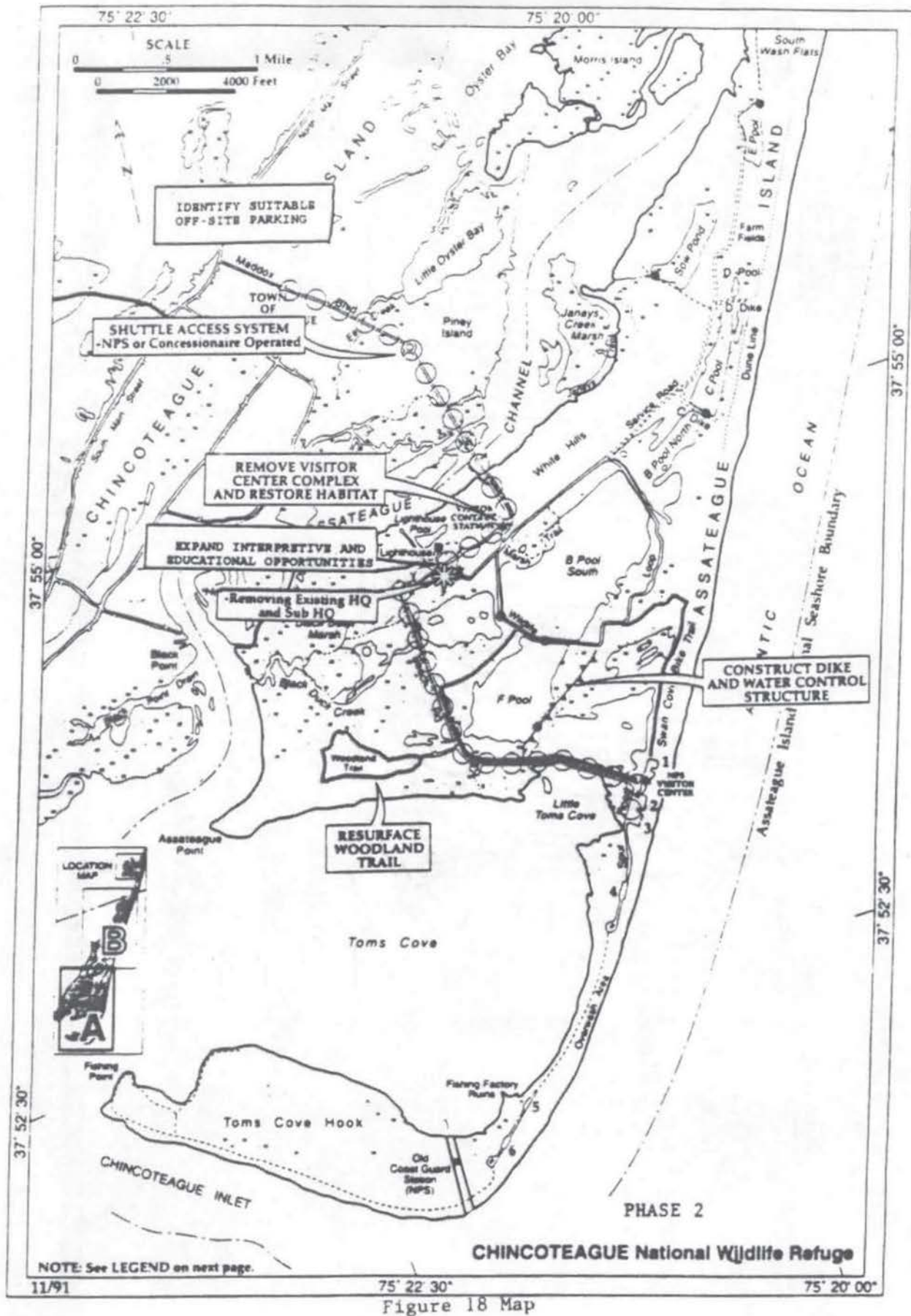


Figure 17 Map Continued





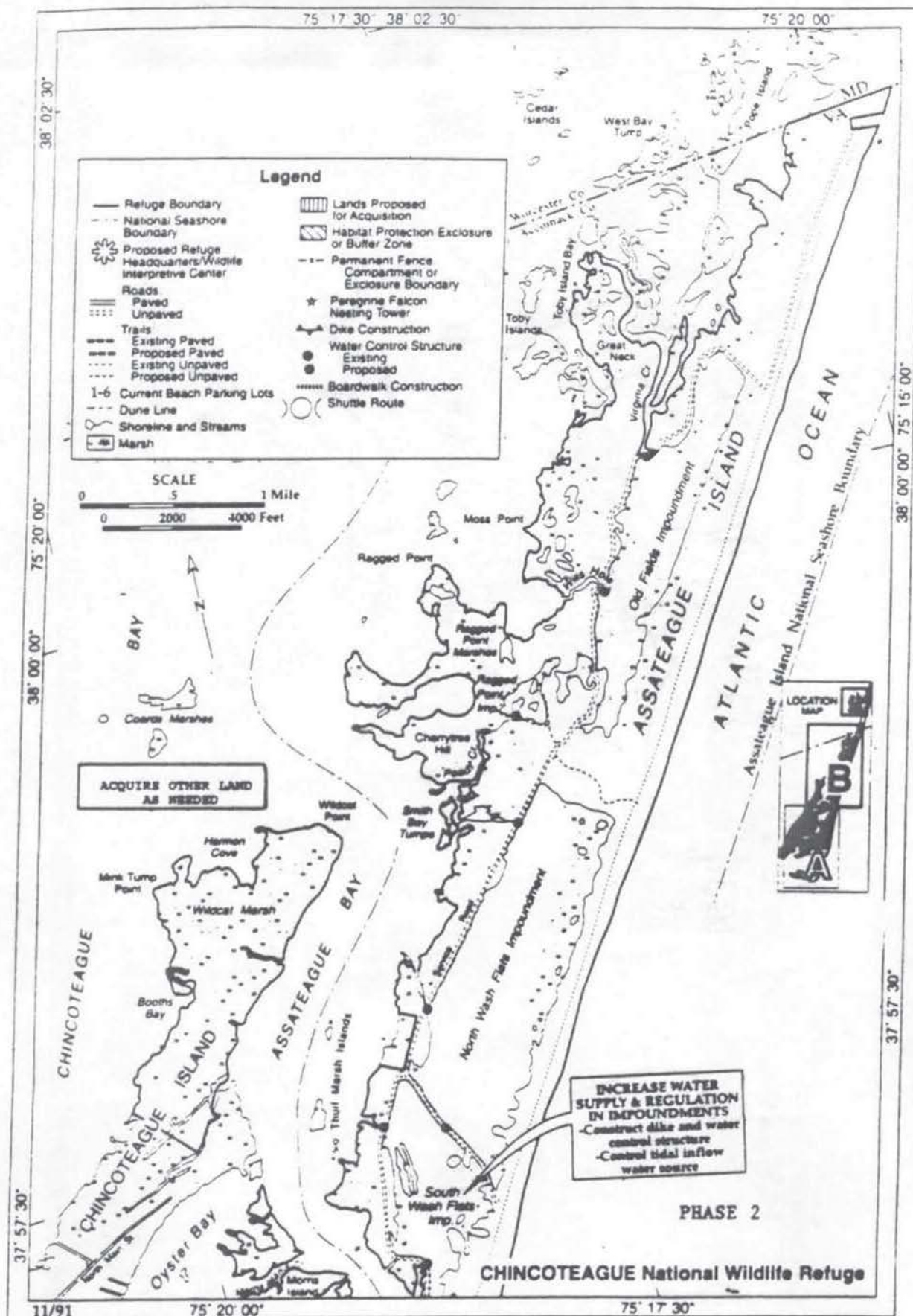


Figure 18 Map Continued

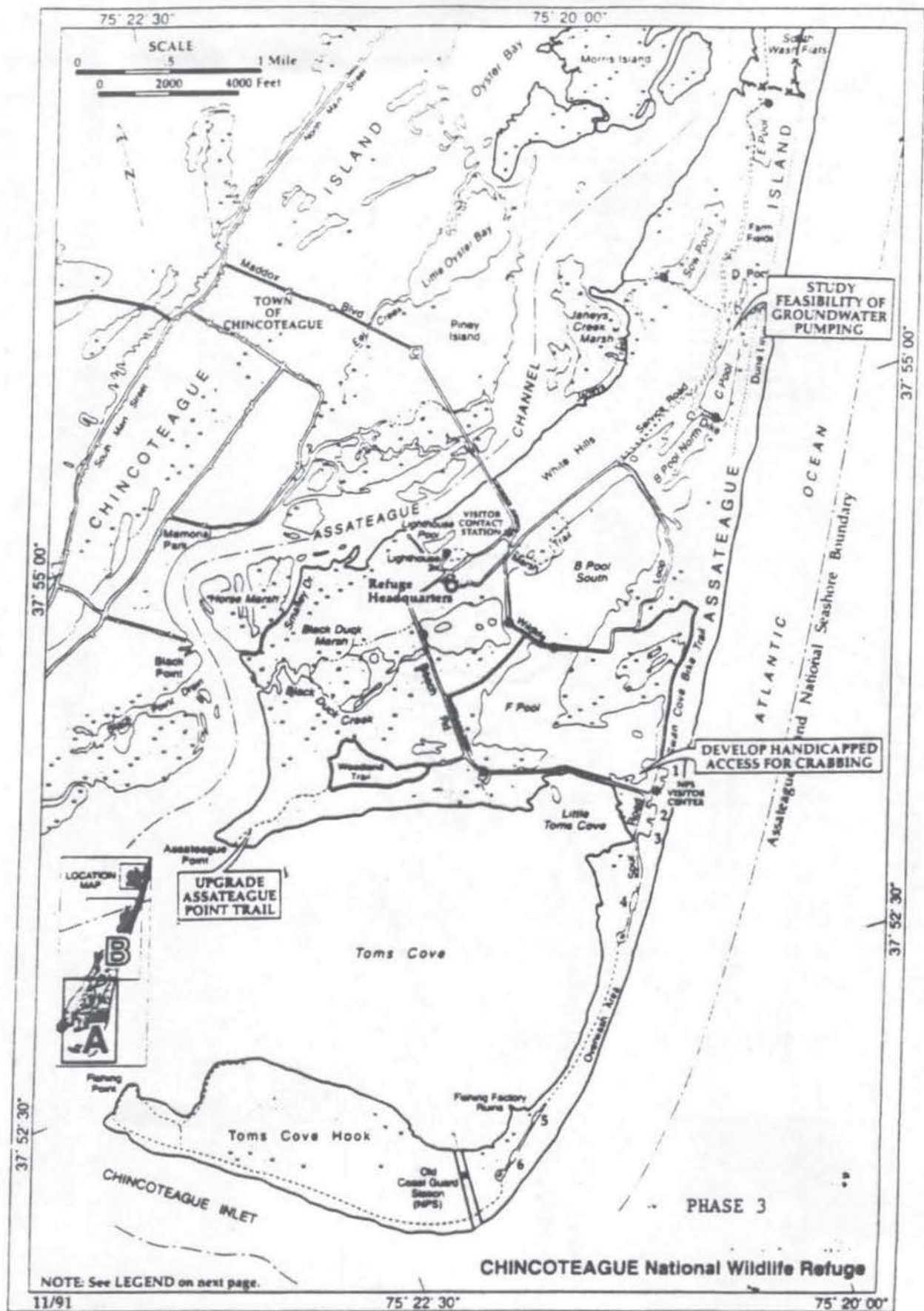
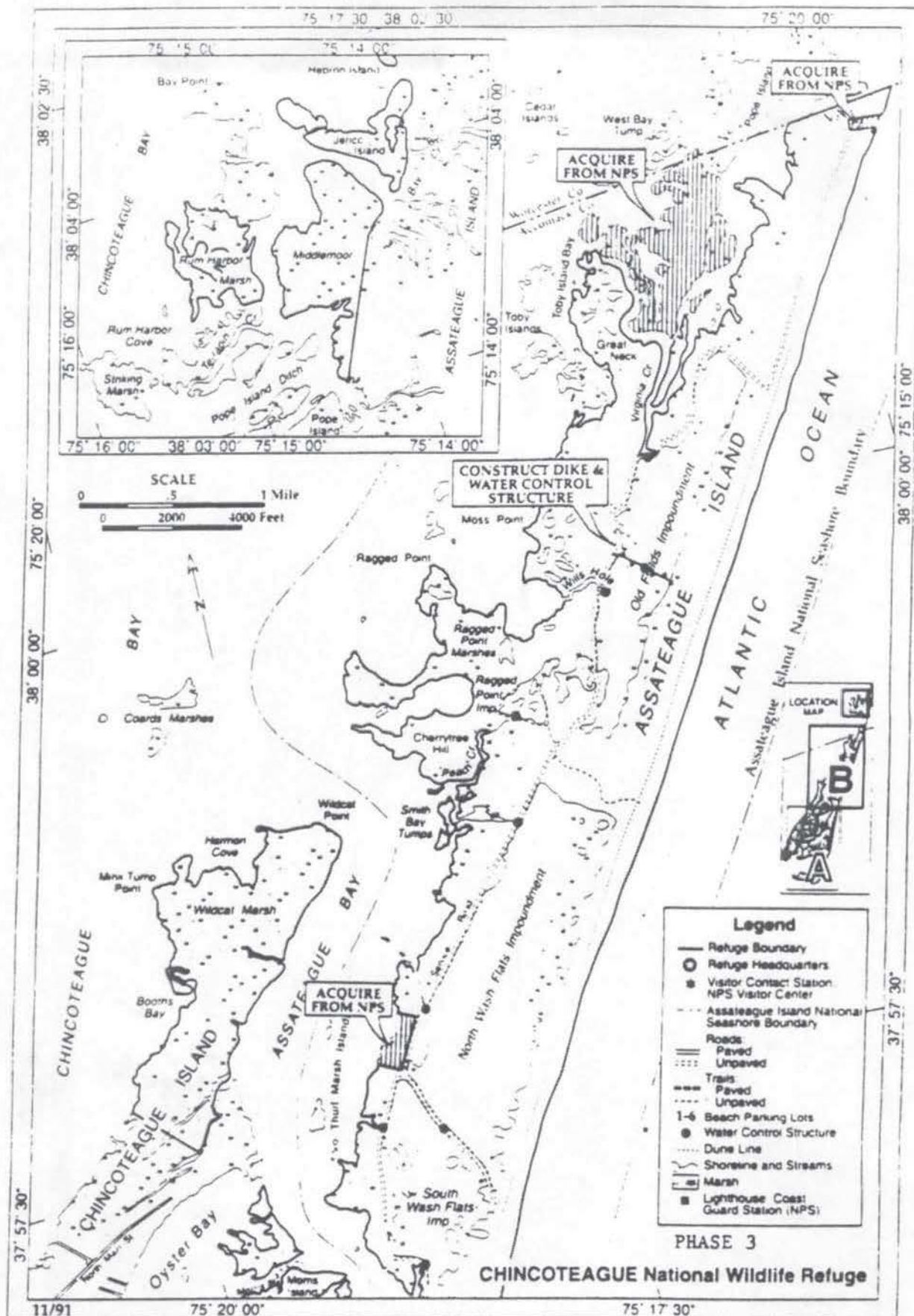


Figure 19 Map,





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